FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

First Aeronautical Weekly in the World. Founded January, 1909

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 1153. (Vol. XXIII. No. 5.) JANUARY 30, 1931 [Weekly, Price 6d. Post free, 7½d. Abroad, 8d.

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C.2.
Telephone: (2 lines), Holborn 3211 and 1884.
Telegrams: Truditur, Westcent, London.

Annual Subscription Rates, Post Free.
United Kingdom .. 33s. 0d. United States .. $8·75.
Other Countries .. 35s. 0d.*
* *Foreign subscriptions must be remitted in British currency* (*See last Editorial Page.*)

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Feb. 1 Hanworth Club Special Meeting of Members.
Feb. 5 .. "Wapiti in Australia," Lecture, by Sqdn.-Ldr. C. T. Anderson, before Westland Aircraft Soc.
Feb. 6 .. De H. Aeronautical Technical School Ball, at Portman Rooms.
Feb. 11 "Future of Aeroplane Design for the Services," R.U.S.I. Lecture, by C. R. Fairey. 3 p.m.
Feb. 11 Association Football: R.A.F. v. Civil Service, Uxbridge.
Feb. 12 "Air Navigation," Lecture, by Capt. N. Macmillan, before R.Ae.S. and G.A.P.A.N.
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Feb. 25 "Land and Air Defence Forces of Australia," R.U.S.I. Lecture, by Maj.-Gen. J. H. Bruche, 3 p.m.
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Feb. 27 "Aircraft Light Alloys," Lecture, by H. Sutton, before R.Ae.S., Hull.

EDITORIAL COMMENT

THE Schneider Trophy is not yet lost. Last Tuesday night the Prime Minister received a deputation of four members of Parliament, and agreed to reconsider the attitude of the Government with regard to the defence of the trophy by the Royal Air Force. We hope that by the time this issue of FLIGHT has been published the welcome announcement will have been made that all is well, and that nothing now remains to do except to prepare the machines and engines and put the pilots into training.

The Government and the Schneider

Assuming that our hope will be realised, we must congratulate the Royal Aero Club, and in particular its diplomatic chairman, Sir Philip Sassoon, on the way in which it has fought its case. With true British spirit, it refused to accept defeat when all seemed lost. With great tactical skill, it turned the flank of the first trench line which the Government had occupied, and manœuvred the Cabinet into a position which it really was impossible to defend. So long as it was believed that the Treasury was genuinely concerned about saving the taxpayer's money, one could not withhold a certain amount of respect for its attitude, even though we were convinced that the attitude was absolutely mistaken, and that the defence of the trophy would have been easily paid for by the value of the foreign orders which a win would attract to this country.

When the club asked the Government if it would defend the trophy, provided that the cost (assessed at £80,000) could be raised by the club, the flank of the Economy Line was turned. The Governmental Hindenburg would have been wise to have surrendered

at once, but with strange perversity it fell back upon another position—a vague sort of Siegfried Line—which was concerned with the alteration in the character of the contest since 1913, and which professed satisfaction with the amount of high-speed research already carried out. To take up such a position was really bad generalship, for no one could be convinced of its strength. One cannot have too much research on such a matter as high speed, especially if it is paid for by private citizens. As for the alteration in the character of the contest, the great alteration took place between 1913 and 1927. In 1928, M. Jacques Schneider, the donor of the trophy, gave his sanction to the new state of affairs when he personally consented to the contest being held biennially instead of annually. Since then there has been only normal development but no radical change. In any case, there was no obvious reason why the British Government should be so very concerned about the workings of the mind of the late M. Schneider.

Frankly, we do not believe that Mr. Ramsay MacDonald himself was responsible for the very clumsy tactics pursued by his staff, and we have considerable sympathy for the authorities of the Air Ministry, who, we believe, were placed in a false position by their colleagues, and were obliged to attempt a defence of that position. We think it fairly certain that Mr. MacDonald, Lord Amulree, and Mr. Montague were all personally in favour of letting the Royal Air Force defend the trophy. We have a higher opinion of the Prime Minister and of Mr. Montague than to think that they were really convinced by the feeble excuses which they were obliged to make in loyalty to their colleagues. The Prime Minister, on the night of the victory in September, 1929, uttered words which conveyed an impression to all hearers that he was "all out" to get another victory in 1931. His attempt the other day to distinguish between a Government effort and a National effort was what we must expect from almost any politician who finds himself in a false position. Likewise, when Mr. MacDonald said that he wished the deputation of Members of Parliament had approached him 15 months ago instead of now, he must have known, or should have known, that there were very good reasons why the situation was slow in developing. From June last until the end of the year the dispute about the terms of challenging was in progress, and not until valid challenges had been received and accepted could the Royal Aero Club place concrete proposals before the Air Ministry. The Air Ministry was, however, kept fully informed about the course of the discussion between the British club and the F.A.I., so that nothing new was sprung upon it after the receipt of the challenges. Still, one accepts it that any politician who is about to surrender an untenable position must utter some excuses, plausible or otherwise, in order, as the Chinese say, to "save face." Provided that the final answer is satisfactory, all previous futilities may be forgotten.

Before concluding this article, we should like to put on record our high appreciation of the sporting offer of Lady Houston to be responsible for any sum which the chairman of the Royal Aero Club cannot otherwise raise. So long as our rich men and women will spend their money in such a way on objects of national importance, they amply justify their existence.

The Meopham Report

The publication of the Technical Report of the Accidents Investigation Sub-Committee of the Aeronautical Research Committee as a Reports and Memoranda booklet (No. 1360) on the accident to the Junkers aircraft, G-AAZK, is something of an event, not merely because of the somewhat remarkable character of the particular accident, but also because it is the first time that such a report has been made available to the general public.

The Accidents Investigation Sub-Committee comes to the conclusion that the primary cause of the accident must have been a form of tail vibration, differing from that known as "tail flutter" in that it is irregular, and occurs at large angles only, and then more particularly in the case of low-wing monoplanes. To the new phenomenon the sub-committee gives the name "tail buffeting," and the recommendation is made that this phenomenon should be investigated. The report gives the sub-committee's reasons for discarding the theory that the port main plane broke first, as a result of too sudden application of the elevator control, although this is the one and only of the "plausible causes" which is not dismissed quite briefly as a possibility. The sub-committee's reason for refusing to admit the breaking of the wing as the primary cause is that in ten years of aircraft accidents in Great Britain there has been no single case of the tail breaking after the wings. Either the tail has broken first, or it has been intact.

That, on the face of it, sounds a reasonable assumption. But on the other hand, if past experience is to be quoted on one side, and the law of probabilities brought into use, the same could, and should be done on the other, which is that some 400 Junkers machines of similar type have been flying in all parts of the world, with never a similar accident occurring. Breakages in the air have been known (outside Germany), but these have been ascribed to faulty piloting. With the wording of one of the paragraphs of the report it is a little difficult to agree. We refer to paragraph 69 on p. 23 of the report, which states: "It has already been shown that unless the speed of the aeroplane exceeds 134 m.p.h. it is impossible for the pilot to cause breakage of the wings by abrupt use of his elevator control. He would therefore have first to permit the aircraft to pick up sufficient speed and then to flatten out suddenly, which manœuvre he is most unlikely to attempt at a height of 1,500 ft. . . ."

That seems to us a somewhat remarkable statement to make. If, for example, the machine was in a cloud and the pilot was not too certain of its altitude, he might well come out of the cloud in a steep dive and, suddenly seeing the ground, would momentarily think he was lower than he actually was and, as a result, pull out of the dive rather more abruptly than he would do if he knew he had plenty of height. The breaking of the tail in the air *could*, one presumes, have been caused by the broken port wing folding back on the tail. That no such case has been known in ten years of accidents in Great Britain is scarcely conclusive proof. It must be remembered that we have had no English low-wing monoplanes break in the air, and a breaking biplane structure might conceivably behave in a rather different manner.

At any rate, the plausible causes of the accident appear to have been reduced to these two, and the Accidents Investigation Sub-Committee favours the "tail buffeting" theory.

BRITISH EMPIRE TRADE EXHIBITION BUENOS AIRES 1931

H.M.S. "Eagle" is the British Aircraft Carrier which will visit South America during the Exhibition.

(R.A.F. Photo., Crown Copyright.)

THE British Aircraft Industry will be well represented at the British Empire Trade Exhibition which will be formally opened by H.R.H. the Prince of Wales in Buenos Aires on March 14. In addition to the aircraft, aero engines, accessories and materials exhibited in the Government Pavilion, the aircraft carrier "Eagle" will cruise in South American waters for several weeks, and will have on board three flights of aircraft, two of which will be of the types used as standard equipment of the carrier, while the third flight will include some of the fastest single-seaters and two-seaters of the Fleet Air Arm, the latest types which have not yet been issued as standard equipment.

In connection with the Buenos Aires Exhibition, the Society of British Aircraft Constructors will issue shortly a publication compiled jointly by the staffs of FLIGHT and *The Aeroplane*, dealing with the British Aircraft Industry. This publication, the text of which will be in Spanish, will contain messages from a number of prominent British officials, a series of Editorial articles on different aspects of Britain's air activities, descriptive illustrated articles dealing with British aircraft, aero engines, accessories, materials and so forth. This publication, which will form a most valuable guide for South American purchasers, will be available not only at the Exhibition but throughout the different South American countries. The products described and illustrated will include very many not actually exhibited at Buenos Aires, so that the publication will be truly representative of the whole of the British Aircraft Industry.

Starting before the opening of the Exhibition will be a series of flying displays, staged at El Palomar, where manufacturers who have aircraft in South America will be able to demonstrate their machines before any potential purchasers, so that what with the aircraft exhibited in the show, those carried on board the *Eagle*, and those at El Palomar, British aviation will have an unprecedented opportunity of showing British products. Many other South American States will also be visited.

The aviation firms which have taken space in the Government Pavilion are: Armstrong Siddeley Motors, Ltd., Sir W. G. Armstrong Whitworth Aircraft, Ltd., the Bristol Aeroplane Co., Ltd., The De Havilland Aircraft Co., Ltd., Palmer Tyre, Ltd., A. V. Roe & Co., Ltd., Rolls-Royce, Ltd., Smith's Aircraft Instruments, The Supermarine Aviation Works, Ltd., Vickers (Aviation), Ltd., and C. C. Wakefield & Co., Ltd.

The Exhibits

Armstrong Siddeley Motors will be showing a complete range of radial air-cooled engines, from the "Genet" to the "Leopard," and Armstrong-Whitworth will exhibit samples of their steel construction, &c.

The Bristol Aeroplane Co., Ltd., will exhibit a "Jupiter" engine and models of Bristol aeroplanes.

Of De Havilland products, there will be a "Puss Moth" and a "Gipsy Moth," with, of course, their De Havilland "Gipsy" engines.

On the Avro stand will be seen six skeleton fuselage portions demonstrating the different branches of advanced training for which the new Avro type 626 can be used.

Rolls-Royce, Ltd., will be represented by a sectioned "F" type engine.

Vickers and Supermarine will have a joint exhibit of models, transparencies, &c., showing the products of the two firms.

Palmer Tyres will be represented by a series of aircraft wheels, with and without wheel brakes.

Smith's Aircraft Instruments will be displayed on a series of panels showing various combinations of instruments.

Wakefield & Co. (who will be represented by Evans, Thornton & Co.) will exhibit oils and lubricants of all kinds.

The Flying Demonstrations

At El Palomar Aerodrome, placed at the disposal of British firms by the Military Air Authorities of Argentina, demonstrations will be given by an Armstrong-Whitworth "Atlas," a Hawker "Tomtit," an Avro type 626 advanced training machine, an Avro "Avian," and a Westland "Wapiti" general-purpose machine.

These flying demonstrations will begin before the opening of the Exhibition, and some of the machines used will later on go to other South American countries on demonstration tours. Thus the Westland "Wapiti," which will have two types of undercarriage, a wheel type and a float type, will, after the Exhibition, be sent to Uruguay, and from there, as a landplane, to Santiago in Chile, the floats being sent by train. After demonstration in Chile, the "Wapiti" will fly to Valparaiso, where the floats will be fitted. It is possible also that the "Wapiti" will visit Peru. At any rate, it will return to Buenos Aires prior to shipment home.

Other British firms have similar plans for their machines, but details of these are not available at the moment.

His Royal Highness the Prince of Wales has expressed a desire to spend a day at El Palomar to inspect the British aircraft, and the visit of His Royal Highness is likely to take place about a week before the opening of the Exhibition. The Prince of Wales, as is already well known, will have his "Puss Moth" available for making such journeys by air as may be necessary in order to enable him to keep some of his many appointments. The machine will have the distinction of being the only civil aeroplane to be sent out in the *Eagle*.

The Question of Patents

A very generous gesture has been made by the Argentine Government in a decree recently issued. All British patented inventions and designs registered by exhibitors as showing at Buenos Aires are automatically protected in the Argentine Republic from the date of the decree until three years after the closing of the Exhibition.

This lengthy period of protection is of obvious value to all exhibitors, more especially as the formalities to be complied with to obtain such protection have been reduced to an absolute minimum.

PRIVATE FLYING AND CLUB NEWS

BROOKLANDS OPENS THE SEASON

A few of the Delegates of the Indian Round Table Conference watching the flying demonstrations of Brooklands. (FLIGHT *Photo.*)

BROOKLANDS aerodrome on Saturday afternoon, January 24, again presented the animated scene to which we have become so accustomed through the vast number of flying meetings which were held last year. As last year, Brooklands again held the first meeting of the season, and on this ocasion they did so, to use their own words, "in honour of the Round Table Conference and to give the delegates to the Conference an idea of the scope and practicability of modern aircraft." A large number of these delegates and their friends came down and appeared thoroughly interested and keen in all they saw, if one was to judge from the way in which they crowded round each machine while it was being explained by Capt. Davis. It was quite one of the finest days we have had for many weeks but was unfortunately very cold, and probably that combined with the early date accounted for the remarkable fact that very few of the ordinary flying people one is used to seeing at these meetings, were there. Possibly, though, this is only the outcome of the feelings that we have heard expressed so many times, that the flying meeting business is over-done and that people will not go to them so much in future. If so, this may be a blessing in disguise, for undoubtedly there is no real justification to have the same bunch of people meeting each other, week after week, at different aerodromes unless their presence increases the number of local people who come to watch and thereby become keen on aviation, and this does not always appear to be the fact. Probably, if these meetings gradually become more and more purely local shows then the local authorities concerned will make still further efforts to raise local enthusiasm, since they will not be able to rely on such a large attendance from away. Already we hear that the combine of petrol companies have decided that their aviation representatives, although attending upon their own machines, shall not take part by giving individual displays, etc.

However, on Saturday, in spite of the small attendance of visiting machines, there was quite a fair crowd in the public enclosures and they certainly enjoyed the flying. This started off with a very representative fly past led by Mr. G. E. Lowdell, one of the Brooklands Club Instructors, in the Widgeon (Hermes II), now painted a rich red, which last year was such a consistent performer in the hands of Mr. R. J. Cazelet. Following him came a Bluebird, Gipsy I (Mr. R. B. Waters); a Puss-Moth, Gipsy II (Capt. H. S. Broad); a Spartan 3-seater, Gipsy II (Col. L. Strange); a Moth, Gipsy I (Mr. K. Murray); a Klemm-Salmson (Mr. J. Rogers); and a Desoutter II, Gipsy III (Mr. J. Youell). During the fly past Mr. J. H. Cordes brought over a Hinaidi (2 Jupiters) and he proceeded to wallow about in the wind hanging on his slots and thereby thoroughly advertising that commodity which has made his firm so much talked about. Mr. Thorn then gave an aerobatic display on the sports Avian (Hermes II). He is certainly one of the cleanest and most polished aerobatic pilots we see about nowadays. Everything he does is done

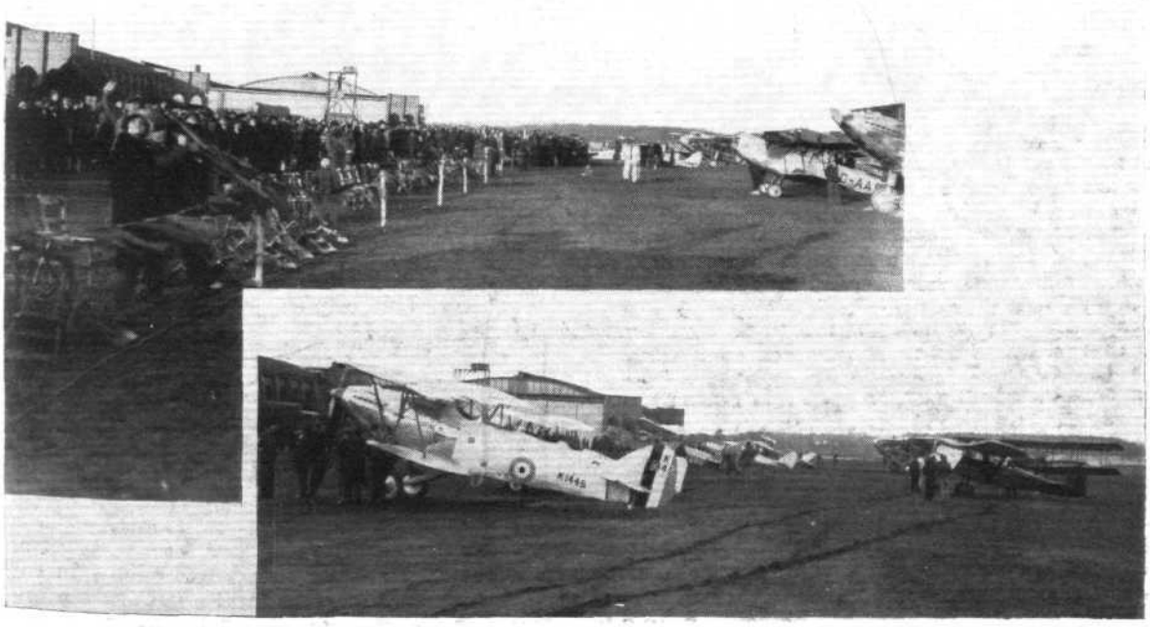
Some of the pilots who took part in the flying demonstrations at Brooklands on Saturday. (FLIGHT *Photo.*)

Fl.-Lt. P. W. S. Bulman flying the Hawker "Hart" (left), and (right) the Vickers "Viastra," one of the latest British commercial aeroplanes, at Brooklands "India Demonstration." (FLIGHT *Photos.*)

so smoothly and easily, that it looks very simple; so much so that we are afraid the public do not realise the skill which is required. Readers will probably remember that recently we published articles pointing out that for private flying to become popular, pilots will have to be made to behave in a decent manner and obey the existing rules, unless they want everyone to be bound up in a mass of galling legislation, and we shall therefore throughout the coming season not hesitate to remark on any case of unnecessary negligence during these meetings. The first of these occurred on Saturday during Mr. Thorn's display. It was not so much a case of a definite breach of the rules but more one of those things which anyone who thinks, ought not to do. While Mr. Thorn was in the air, actually he was on a roll at the moment, a machine came in, and instead of doing a circuit and quietly choosing his chance to sit down where he would create least disturbance, he came right across the whole length of the aerodrome giving an exhibition of crazy flying a very few feet above the ground. The pilot in question is an expert at the job, and in spite of the bumpy weather was probably perfectly safe, but the point is that not only was it very bad form to detract from Mr. Thorn's display, but also he was playing round where he had no right to do so. This sort of thing will only tend to make the public think that all pilots necessarily become trick riders, instead of making them realise that flying properly and safely carried out is a safe and sure means of getting from "A" to "B."

Two more types seen at Brooklands—the Hawker "Tomtit" (Cirrus "Hermes"), piloted by P. E. G. Sayer (top), and the Vickers "Virginia" Bomber. (FLIGHT *Photos.*)

The next item was Mr. K. Murray on his own Moth, which is fitted for inverted flying. Mr. Murray has evidently not been hibernating all the winter and lost any of his skill of last year as a private owner. Originally trained at the Brooklands School of Flying, he is certainly one of the star turns in the country at the moment, and his outside loops performed by diving in the inverted position and then looping upwards and finishing inverted again are a test which very few service pilots can carry out as creditably as he can. About this time a Saro "Cloud" (two Whirlwinds) arrived and by the interest shown we imagine that most of the Indian delegates had not seen a modern amphibian machine before. Capt. Broad then took



AT BROOKLANDS: **A general view showing some of the spectators and, below, some of the machines which gave flying demonstrations.** (FLIGHT *Photos.*)

up his Puss-Moth and showed that it is very controllable in the air. Actually the most interesting part of his display was not so much the control in the air, but the control on the ground, as when he landed he proceeded to show the use of the semi-balloon tyres and wheel brakes as fitted to the 1931 model. As he was taxying up, the usual two or three assistants ran out to hold up his wing tips, and he disdainfully waved them away and steered the machine with his brakes just where it was wanted.

Mr. P. E. G. Sayer then demonstrated the Tomtit (Hermes) and gave a really amazing display of stalled flight. He was lucky to have a stiff breeze which, naturally, made it so much more spectacular. After this Mr. P. W. S. Bulman demonstrated the Hawker "Hart" Rolls-Royce F.XI.B. This is, of course, one of the standard service machines now, and although a two-seater, high-speed day bomber, it has a performance far in advance of all except our most recent single-seater fighters. Mr. Bulman is, of course, an absolutely super demonstration pilot and always puts the machine in just the position and at just the spot at which it is shown off to the best advantage. The way he suddenly came round the corner of the Hawker hangars in a vertical bank at a terrific speed was enough to impress upon anyone the superiority of our modern fighting aircraft.

Mr. J. Summers took up a Virginia about this time and was also nearly able to stand still in the wind and show that although a large and unwieldy looking bomber, it is capable of being thrown about mildly if necessary. The star turn in the matter of stall flight against the wind and in some cases of actually skating backwards across the aerodrome was undoubtedly Mr. G. E. Lowdell on the Widgeon (Hermes). This machine is, of course, exceptionally good for this sort of thing, being a parasol monoplane, and he showed clearly that he has plenty of lateral control even when completely stalled and sinking almost vertically. The display was, of course, arranged by the Brooklands School of Flying, together with the B.A.R.C. and the Brooklands Aero Club. It is not generally known that Mr. F. Sigrist is now a Director of the school and that many recent developments are attributable to his interest in it.

We understand that a development policy has been decided upon, which will include pulling down those ancient wooden sheds so long associated with flying at Brooklands and utilising one of the large hangars between Hawkers and Vickers. The aerodrome surface has also recently been levelled and rolled and is now in good condition. The Aero Club is certainly flourishing and we understand there is a possibility of a larger club house being built before long.

HANWORTH CLUB Developments.—We are informed that a special meeting of members will be held at the club on Sunday next, February 1, at 5.30 p.m. This has apparently been arranged by a committee formed of certain members, with a chairman chosen by N.F.S. If this committee is really representative of the members as a whole, and has been elected by them, there is no doubt that it should be able to carry out many of the reforms which are wanted at the club. We hope, therefore, that this will herald an era of prosperity for the club, and perhaps we shall see it become something like its originators meant it to be.

LEICESTERSHIRE Aero Club.—At the first annual meeting of the Leicestershire Aero Club., Ltd., held in Leicester, on Wednesday, January 14, Mr. W. Lindsay Everard, M.P., who presided, congratulated the Leicestershire quarryowners upon their enterprise in being the first in the industry to send representatives with samples of road-making granite by air to keep appointments with surveyors at far distances.

In moving the adoption of the annual report, the chairman stated that, during the year, several other interesting flights had been undertaken, and that members of the club had flown 1,200 hr., representing a distance of 100,000 miles, "without one single bone of any passenger or pilot having been broken or injured."

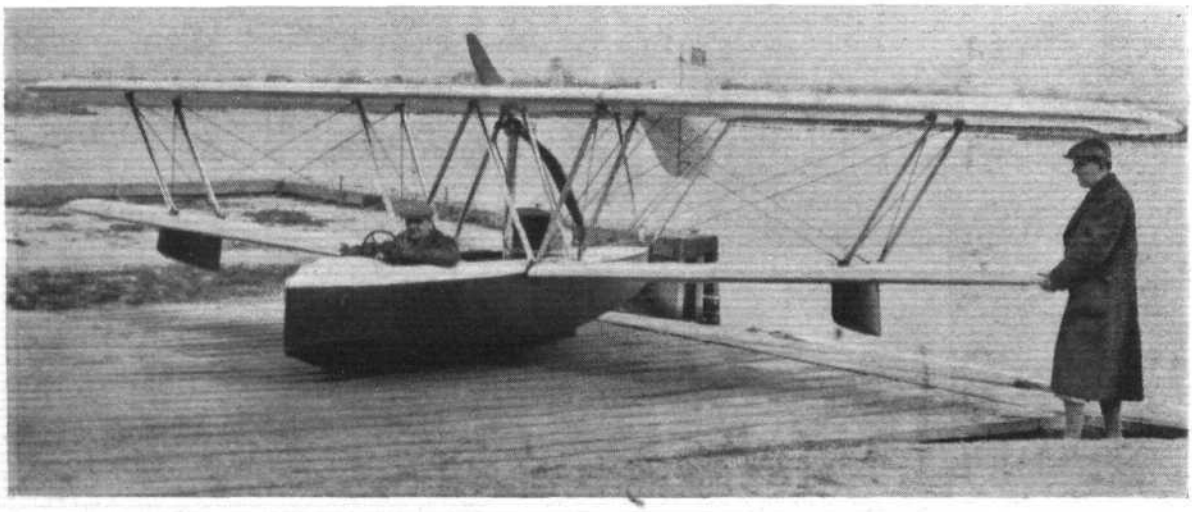
The club, which has a membership of over 900, is contemplating the inauguration of a weekly or bi-weekly commercial air service to some of the less accessible industrial centres.

The President also announced, with great regret, that Mr. H. Purt, who had held the office of Hon. Secretary since the club was formed, two years ago, had been compelled, owing to the pressure of his many duties, to relinquish the position. Mr. Everard paid tribute to the splendid work which the Hon. Secretary had done, and said that no other man in Leicester could have organised the club as he had done in such a short space of time. Mr. Sidney Brown and Mr. R. H. S. Brown were appointed joint hon. secretaries for the year.

CINQUE PORTS Flying Club.—High wind stopped club flying on Friday and Saturday, January 23 and 24, but on Saturday, G-EBTD was delivered from Hanworth, and G-EBSA was taken away in part exchange.

During the year 1930, the club aircraft between them flew just over 1,000 hr., and during that time the collective average petrol consumption was only 4·0958 gallons per hour. This is roughly equivalent to 20 miles per gallon. During the same period, the Cirrus (II) engines consumed 0·6949 quart per hour of Castrol XXL. The best individual figures for petrol consumption were put up by G-EBRI, which, strangely enough, was the dual instruction machine, and which usually carried the biggest load. In April, G-EBRI averaged 3·034 gallons per hour. This is a most exceptional consumption for a Cirrus (II) engine, and is equivalent to over 25 miles to the gallon.

Total flying for the week amounted to 10 hr. 30 min., made up as follows:—Dual instruction (4 members). 1 hr. 45 min. Advanced dual (7 members), 3 hr. 15 min. Soloist under Instruction, 15 min. "A" Pilots (6 members), 3 hr. 45 min. Tests, etc., 1 hr. 45 min.



THE BOOTH BABY FLYING BOAT: Henry Booth, a well-known aeronautical designer and engineer of Freeport, L.I., has designed a new two-seater baby flying-boat, which when in production will sell for about 1,500 dols. This boat is powered with a four-cylinder 32-h.p. Johnson Outboard Marine Engine, has a wing spread of 28 feet, a top speed of 75 m.p.h., and a landing speed of 36 m.p.h. Under test the boat reached an altitude of 8,000 feet and consumed only three gallons of petrol an hour. When fully loaded it weighs 700 pounds.

GLIDING

AUTO-GLIDING: Mr. Lowe Wylde making a towed flight in his Glider at Hanworth.

AN INSTRUCTIONAL DEVELOPMENT

LAST week we queried the value of the Zögling type of glider even for primary instruction, and after the demonstration at Hanworth on Sunday last, January 25, we are rather inclined to think even more strongly that the Zögling fulfils no real place at all. The occasion was one of a demonstration of towed flight by Mr. Lowe-Wylde, in conjunction with the authorities at Hanworth. The machines used were a somewhat more efficient development of the Prüfling type of glider, and fitted with a small undercarriage and a pair of diminutive Goodyear Air Wheels. The glider was attached by a light cable to a car by means of a quick release, which the pilot could operate easily. The cable is on a brake-controlled drum, operated by a man who sits facing the glider. The driver then goes steadily ahead, and by means of his speed can regulate whether the glider is air borne and can climb, or whether it just trundles along the ground at such a speed that the pilot can use the controls without actually leaving the ground. It can readily be seen, therefore, that flights can be made in every stage from merely being towed along the ground to being kited up to several hundred feet before the pilot operates his release, drops the cable and circles round to land. He may then, to look a long way ahead at some future date in a very efficient machine, reach the underside of cumulus clouds, and make use of the up-current under the cloud to continue further soaring. It seems to us that the importance of gliding as such has been over-rated, and far too many clubs have merely looked upon it as the be-all and end-all of their existence. In our opinion, there are only two ways of flying: one is soaring flight and the other power-driven flight. Up to the present, training for soaring flight has been carried out by being perched on the front of a form of aerial toboggan, and then catapulted down a slope by means of an elastic cord so that the pilot just continues to glide until he reaches the bottom of the hill, after which, much sweat and pullee-haulee is required to get the machine to the top again ready for the next man, with the consequence that only a limited number of people can get flights of a few seconds' duration every day. Even after they can control this form of glider safely, they have a lot to learn before they are likely to be safe in a more efficient type, which will actually soar. The training for power-driven flight has been carried out in an actual power-driven machine, whereby the budding pilot is gradually

"THE END OF A PERFECT TOW": The Lowe Wylde "Auto-Glider" about to land after being towed by the car seen in the foreground.

taught the uses of the various controls, and this necessitates the upkeep of the machine and engine the whole time, and the replacement of an expensive structure and engine should a crash occur. This towed flight does seem to us to offer a means whereby pupils may be taught the function and operation of aeroplane controls in a comparatively cheap and safe way, and when they are capable of being towed up to 300 ft. or 400 ft., and making satisfactory landings from that height to within a few yards of a predetermined position, they should be able to graduate with far less difficulty and cost, to either soaring flight or power-driven flight ; in fact, there would be a distinct possibility of towed flight becoming the basic instruction for both forms of flying. Whether or not the utilisation of this form of instruction will be found to be cheaper than using power-driven aircraft from the beginning is naturally open to discussion, but on the face of it there certainly seems a possibility that it would be so, and it therefore warrants very careful investigation by all those who operate flying schools and clubs. There is one point, however, which certainly cannot be stressed too heavily and that is the necessity of having both the driver, and the man who operates the brake drum carrying the cable, men who know their jobs thoroughly. It is obvious that with them rests the safety of those learning by this method. The skilled driver will be able to keep the glider upon the ground and even check in time any faults which the pupil may make by wild use of the controls, and unless this method is confined to instructors who do know their job it is to be feared that we shall repeat in this country some of the fatal crashes which occurred in America. Taken steadily, however, it would seem that there is less potential danger in this method than there is in catapulting people off slopes in a Zögling. Why, for instance, should a telephone not be used to communicate with the pupil while he is actually under instruction ? It should not be very difficult to incorporate this inside the towing cable in the same way that we used to have it in the kite balloon cables during the late war. On Sunday there was a large crowd, amongst which were many of our well-known designers and the bigger people in aviation, and all whom we spoke to thought that there " might be something in it."

A Close-up of the Lowe Wylde " Auto-Glider " and its prime mover. Note the brake-controlled winch which carries the towing cable, also the " air-wheel " undercarriage

Mr. Lowe-Wylde and the British Aircraft Co., at Maidstone, are to be congratulated upon their enterprise in introducing this form of flying, and we understand that they are willing to arrange demonstrations wherever they are required. Those interested should therefore get into touch with this firm.

THE BRITISH GLIDING ASSOCIATION will hold its Annual General Meeting in the library of the Royal Aeronautical Society, 7, Albemarle Street, London, W.1, on Friday, February 27, 1931, at 7.15 p.m. The business of the meeting will include the election of representatives on the Council of Founder Members, Ordinary Members, and Life Members of the Association.

Nominations, which must be signed by two members and the candidate himself, must be received by the secretary at least 28 days before the meeting, *i.e.*, not later than January 30, 1931.

Secretaries of all affiliated clubs are asked to notify the secretary of the Association, before February 21, of the name and address of the club representatives who will serve on the new Council.

THE ASSOCIATION of Northern Gliding Clubs.—On January 11 there was a west wind of about 40 m.p.h. at the Aircraft Club's Gliding Hill. Only the machine built by the Aircraft Club was taken out and flown by the more advanced members of the Harrogate, Leeds and Bradford Clubs. The longest duration was 37 seconds and the greatest height 80 ft., by an Aircraft Club member.

On January 18 (wind west, 20 m.p.h.) the Leeds, Bradford and Harrogate machines were all out. The Harrogate and Bradford machines each made about 20 flights, the longest being 39 seconds, and Leeds about 5, when the fuselage of their machine was damaged, whilst landing with a lot of drift on. The Ilkley representatives had a flight on the Harrogate glider.

On January 25 only the Bradford machine was out. The wind (W.N.W.) was about 35 miles per hour,. The best flight was 57 seconds, and a height of about 100 ft. above the hill-top was reached. Owing to a snowstorm Harrogate people came out rather late, so spent the afternoon overhauling and greasing their glider. The new Leeds glider arrived, but it was evidently too windy for it to be tried. There is no doubt that the Dickson gliders can be flown in quite strong winds, although one has to keep pretty wide awake when within 6 ft. of the ground.

BRADFORD Gliding Club.—A very successful flying meeting was held at Weeton, Harrogate, on Sunday, January 25. In spite of a 40-mile-an-hour wind, Bradford's chief marshal of the day, Mr. A. M. Verity, decided to rig the club's Dickson machine at about 11.30 a.m. This was accomplished before lunch, with the kind assistance of members of the Leeds Gliding Club, one of whom obligingly remained in the seat of the machine while the Bradford men had lunch. On their return he assured them that the wind had several times lifted the machine bodily to the height of a foot off the ground.

The machine was then hauled to the top of a 50-ft. slope, from which a number of very fine flights were made, the longest being three seconds short of a minute.

These were quite definitely soaring flights. Immediately on launching, the machine shot upwards to a height of 150 ft., hovered for a few seconds, and then slowly moved forward until it got out of the strong up-current, when it descended swiftly and not too comfortably to earth. Although the proceedings were terminated at about 3.30 p.m., owing to a slight damage, which will be quickly repaired, the meeting was certainly the most interesting and instructive that the club has as yet held. It was, of course, only possible for a few of the more advanced members to fly the machine under the prevailing conditions, but they have gained very valuable experience in controlling the machine, and were, one and all, greatly impressed by the manner in which the Dickson machine handled in the high wind. It proved very steady and quick to respond to all controls except the rudder, which was rather sluggish and ineffective, as appears to be the case with all Zögling types.

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

January 30, 1931

CONTENTS

THE PARIS AERO SHOW, 1930.

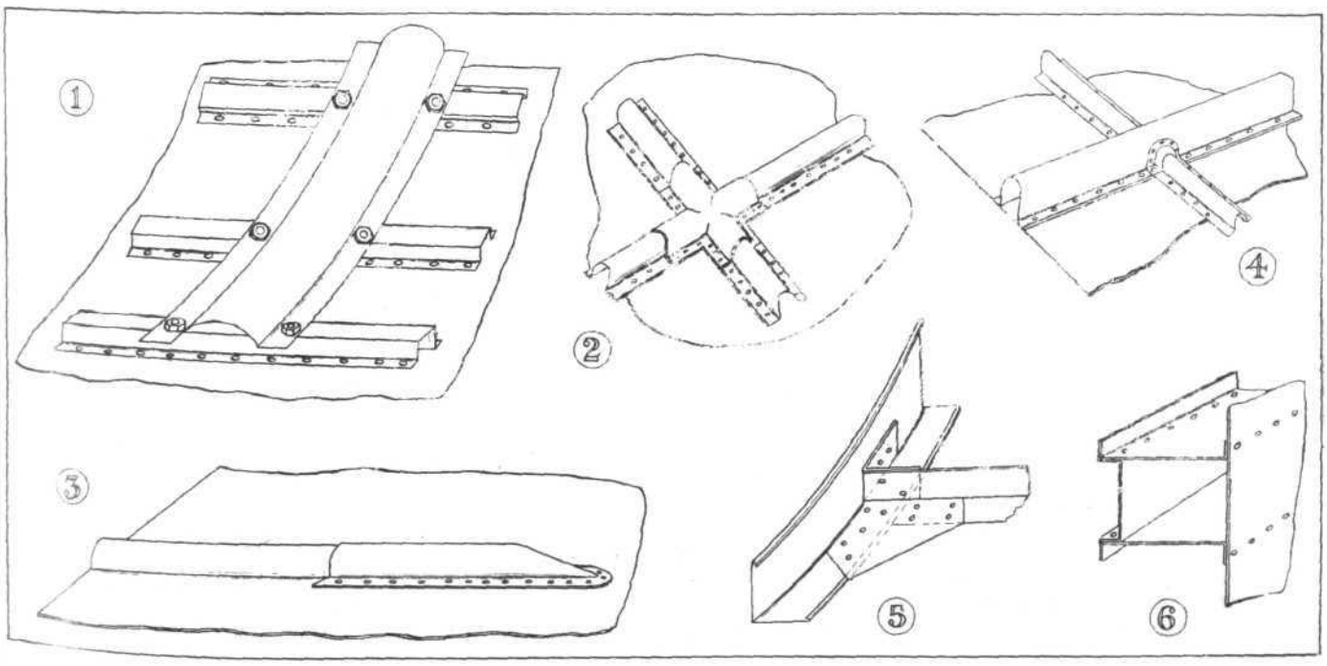
By H. J. Pollard, Wh.Ex., A.F.R.Ae.Soc.

After a preliminary tour of an aeronautical exhibition, one naturally endeavours to decide what are the chief features of development. Opinions frequently differ as to whether an alteration is an improvement, and consequently the term development is not necessarily synonymous with improvement. The results of development of ideas on details of design are often neutral or negative, but the ground has been cleared by the work done, allowing a clearer vision of prospects, and not infrequently developments of ideas lead to definite improvement in design.

In the recent Paris Aero Show the most noteworthy features of general development appeared to be the increased adoption of monoplane structures, together with the increased use of metal covering for both wings and bodies. A fair percentage of the fuselages were of the metal *monocoque* type, and by way of a beginning some observations on these will be appropriate.

The combination of covering, lateral, longitudinal, and in some cases diagonal members, may be effected in a variety of ways; the chief methods available may be tabulated as follows:—

Class.	*Description.*
1	Transverse and lateral members at right angles, the shear being taken up by the thin flat sheet.
2	Transverse and lateral members at right angles, with diagonals added, the shear being taken up by the verticals and diagonals jointly with the thin sheet covering.
3	Deeply corrugated sheet with the corrugations running longitudinally for the purpose of resisting the bending forces, the shear being taken partly across the corrugations and partly on transverse formers.
4	Corrugated panels reinforced by lateral and longitudinal members.
5	As class 4, but with diagonal members added.



In the foregoing, all reinforcements are placed inside the body. Another classification of structures in which external reinforcements are used might be tabulated, but the above clearly shows what variations are possible, and in fact, examples of all these classes were on view in the *Salon de l'Aviation*. In some cases more than one class of construction was used in the same aircraft.

Class 1 seems to be the most rational construction, as a complete structure is obtained and anything additional would appear to be superfluous. This would be the case if the inner structure were stressed to carry the loads independently of the rigid skin (as in a fuselage cited below). The skin, however, may be an essential part of the structure as a stabiliser and stiffener to the individual members of the frame. Diagonal members in a rectangular panel mean smaller areas of unstiffened sheet, and are effective in improving external appearance and also give a more robust structure, but as a matter of fact, Class 1 was the construction most in evidence in the aircraft exhibited, notable among such constructions being Dewoitine D.27, Dewoitine D.35, Liorè, Amiot, C.A.M.S. 80 and Nieuport-Delage. In other cases, whilst a large proportion of the complete body was of the above construction, some variations were made; for example, in the Latécoère hydroplane, the last quarter of the body length was fabric-covered.

The Dornier hull construction was of Class 1 over the rear half and Class 2 in front. Similarly, with the Caudron, except that as a third variant external stiffeners were used on both upper and lower surfaces.

Class 2 type of construction was exhibited by S.P.C.A. and Wibault.

The Junkers Junior had Class 3 to itself, whilst as far as one remembers, the same remark applies to Nieuport-Delage Type 541 as regards Class 4.

As would be expected, the exponents of Class 5 were few.

Potez had sheets having shallow corrugations $\frac{3}{8}$-in. deep or so, probably at about 6-in. pitch; the structure carrying these was fully braced.

The Hanriot H.431 had corrugated detachable panels, held by turnbuttons to a complete strut and wire structure, square tubes suitably joined at the panel joints being used. Also on the Hanriot 215 corrugated panels were used on a braced structure over part of the fuselage, the after third being fabric covered.

The most notable construction having the skin sandwiched between internal and external stiffeners was in the A.N.F. machine.

Examination of the external appearance of machines in Class 1 proved particularly interesting. In some cases the appearance was most pleasing from the point of view of freedom from local buckles, in other cases such buckles were very pronounced.

The futility of attempting to give reasons why metal-covered bodies should be produced in such a variety of ways is fairly obvious. Why have English designers who are developing steel aircraft produced wing spars of such diverse forms? Simply because it is not usual for two people to think alike; yet it would not be possible to say that any English interpretation of what a steel wing spar should be like is definitely superior to any other spar. Similarly, with the French *monocoque* bodies: criticism is possible, but the designer in each case could probably give a decided answer to our questions.

The body of the smaller Nieuport-Delage was entirely free from buckles and had a beautiful finish: this, however, was obtained at the expense of much riveting, 22 longitudinally double rows of rivets being counted. The internal reinforcement consisted of large numbers of end-flanged channel sections, the transverse loops being semi-circular flanged channels laid over the longitudinals. The skin, lateral and longitudinal members were secured with cheese-headed bolts and nuts, as shown in Fig. 1, the shanks of the bolts passing through the longitudinal channel. It was not possible to see whether distance pieces were used or not. While the necessity for cutting either of the stiffeners was avoided, this arrangement did not inspire too much confidence, unless the hoops are called upon to do very little work, or if a little relative movement between these parts is of little consequence. Other methods adopted for reinforcing the metal skin are given later.

A construction which appeared to be superior to the Nieuport was to be found on the Dewoitine D.27: here only twelve double rows of rivets were used. The panels were approximately 18 in. by 9 in. and the whole was very free from buckles. The body curvature was about the same as on the Nieuport, hence closely-spaced stiffeners were not necessary for the purpose of bolstering up the plating against local deformation.

The question of external appearance might be considered to be so closely bound up with external shape that, for example, local buckles in the thin flat plating would be absent in bodies of fairly sharp curvature, and that in "slab-sided" bodies the avoidance of such buckles would be difficult. As a matter of fact, some of the flat-sided exhibits were excellent in this respect, notably the Dornier, while the Liorè boat was another example of excellence in the matter of freedom from local buckles, unsupported panels being up to 6 in. by 1 ft. On the other hand, the Latécoère hydroplane plates, which were approximately 8 in., in width, were very badly buckled in places.

Of course, thickness of plating has much to do with freedom from buckles, but in the three cases cited the plate thickness appeared to be about the same.

No useful purpose will be served in describing in detail every difference between the numerous *monocoque* bodies exhibited. Possibly at future exhibitions we may get some indication of which constructions have proved the most successful.

As stated above, the external appearance of the exhibits varied considerably. The importance of this from a selling point of view cannot be ignored, and the desire to keep plating free from buckles may have led to what we have termed the Class 2 and other classes of construction, instead of the extremely simple construction we have called Class 1. The details of the reinforcements of the other classes are worth mentioning: the usual stiffener was round or rectangular sectioned channel having outwardly extending flanges: in other cases, simple angles, or angles in which the edges were stiffened by bending. Other sections were used for this purpose, but the angles and channels were the most widely used.

In constructions where the whole of the reinforcement lies inside the skin, the principal question arising is what shall be the scheme where the lateral and transverse members cross each other.

In some cases it might be desirable to make the transverse members discontinuous at the hoops, or *vice versa*, having some simple fitting or joint at the point of juncture. An excellent example of this was seen in the Amiot three-engined machine. The construction can easily be seen from Fig. 2. This method of using a separate pressing was also found in some cases where a long ridge was raised in a sheet for purposes of stiffening (see Fig. 3). Probably due to breakages at the ends of the ridges, these pressings offered themselves as a convenient solution. In other cases, similar ridges were made without adopting this artifice at the ends.

In some cases, a small sectional channel longitudinal passed through a larger dimensioned hoop, also of circular channel section, angle pressings being riveted to the main members at the point of crossing (Fig. 4). In other cases, small channels, acting as longitudinals, were attached to larger channels by means of fish plates and small angles, as in Fig. 5. Again, in the Caudron C.180, the skin reinforcement was carried out by means of a number of channels secured together, and to the skin, in the manner shown in Fig. 6, while some of the Hanriot coverings were stiffened by means of corrugations in the sheets, reinforced with flanged circular channels riveted to the sheets at right-angles to the corrugations, as shown in Fig. 7. There is obviously scope for considerable ingenuity in this direction. In one case, I believe on one of the Latécoère exhibits, the transverse formers appeared to be left out at the tail of the machine. The bunching together of the longitudinals may have been sufficient for vertical stiffness in this case.

In considering curved bodies, the choice of a body having as nearly a developable surface as possible is an obvious and fundamental advantage. There appeared to be very little panel beating on the bodies shown. The large *monocoques* were nearly all slab-sided; the probable loss in body drag, due to this, must be considerable. Amends were made, in most cases, by fairings of wheels, tail skid, &c.

Internal observations from the cockpits enabled one to obtain a good idea of the details of construction in many instances, but details of the internal construction of the wings were not so readily obtained. Only the Junkers firm had a stripped all-metal wing, and the details of construction of this, which were of special interest, are dealt with later.

Generally, the wings appeared to be of two-spar construction, although the existence of two external lift members is not necessarily conclusive evidence that there are only two spars in the wing. The principal difference in the wings exhibited was the use and disuse of external corrugations or other means of reinforcement.

Why has Wibault turned all the seams inside the wing, leaving a flat outer surface? Certainly not for the sake of appearance, because that is definitely worse than on previous exhibits. Not that the existence of small local buckles can affect the aerodynamic efficiency of a wing to any very great extent. The statement has definitely been made that external ridges do affect the airflow adversely and appreciably; on the other hand, experiments made in America with vertical fins placed on the wings near the tips have indicated an aerodynamic advantage, although not sufficient to make the use of such fins worth while.

Of the metal-covered wings shown, about half were plain and half corrugated or ridged. The use of very shallow corrugations can only be for appearance in the matter of removing or concealing local buckles in the sheets. The corrugations in the Amiot wing covering, which might have been $\frac{1}{16}$ in. deep and $\frac{1}{8}$ in. pitch did not, however, affect this purpose, as numerous shallow depressions were to be seen on the surface.

Obviously, metal covering for wings has its advantages and disadvantages, compared with fabric covering, and unless the former outweigh the latter, its use cannot endure.

We have often pointed out in these pages that unless rigid covering can be used structurally in addition to its function as a covering, it must compare most unfavourably with fabric. The cost of the material, labour charges, etc., certainly enter into the arguments, and Continental prices for the necessary materials, etc., may have an important bearing on the final choice of material used there. Apart from such considerations, it is essential, from the point of view of weight economy, that rigid covering should contribute something towards the structural strength of the aircraft. There are two ways of doing this: one way is to utilize the sheet coverings chiefly as a main load carrying member, as is done in some types of Rohrbach wing. That is, the coverings carry compressive and tensile forces directly, in addition to supplying the main torsional resistance of the wing. This method usually results in a heavy structure. The other method is to utilise the covering as a stabiliser and stiffener for the internal girder system; economical use of rigid covering can be made in this way. This latter system usually leads to a multi-spar structure.

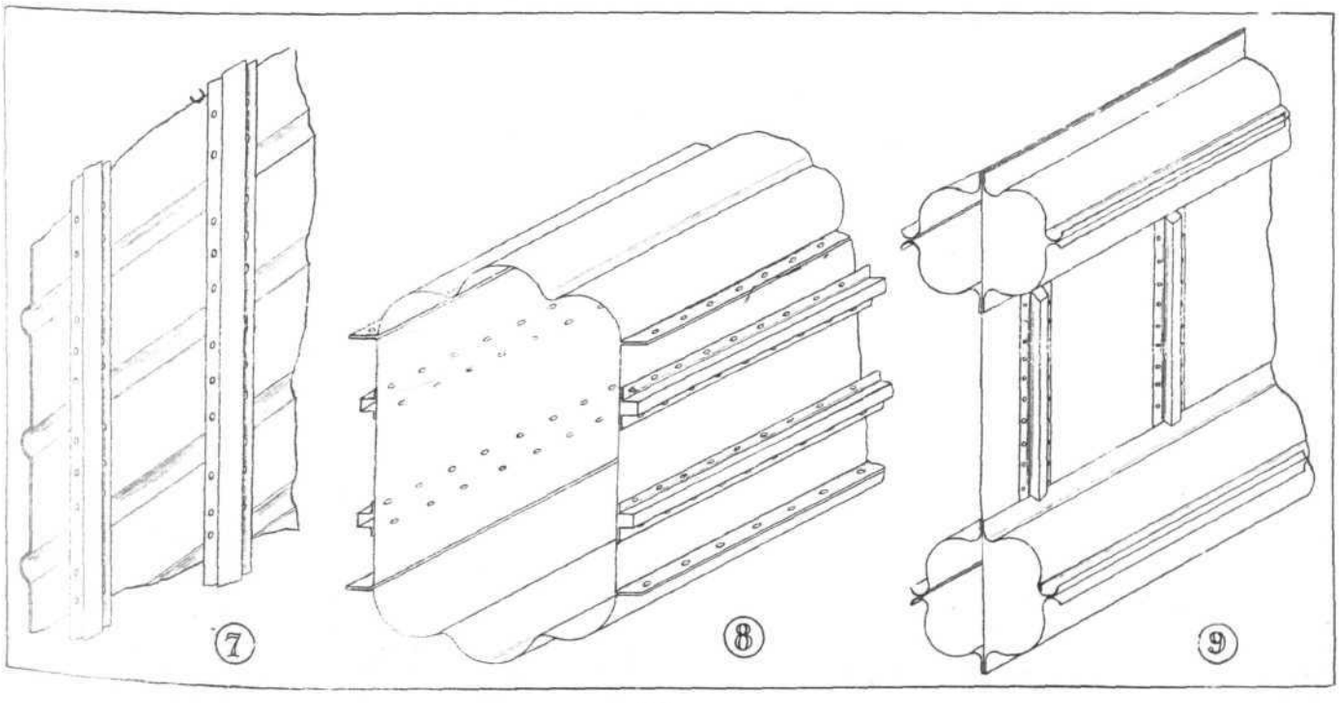
In concluding these remarks on rigid covering, we would say that it does appear a desirable thing to explore fully the relative merits of fuselages consisting of an inner, load-carrying structure, attached to which is an outer fairing, compared with bodies in which the two separate parts are combined in one shell. Excellent shapes can be obtained by the first method, the manufacturing difficulties in the attainment of equally good shapes by the latter method are considerable. The former method lends itself to accurate strength computations; the latter method does not.

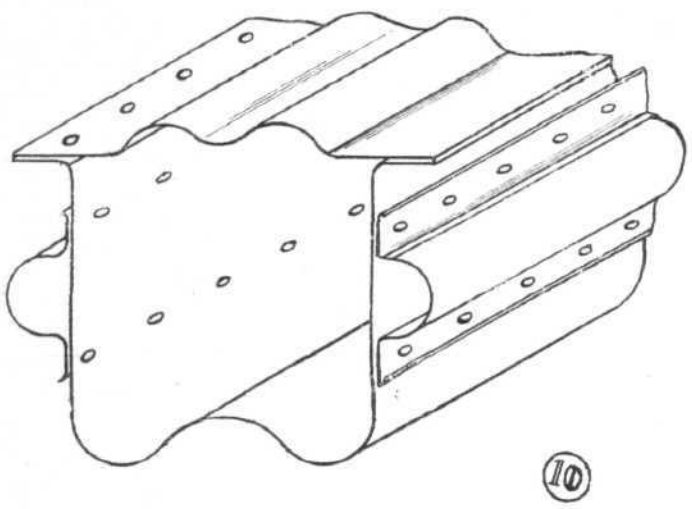
Once a suitable *monocoque* body has been developed, manufacturing costs should not be greater than for the manufacture of faired structures.

The *monocoque* body gives more room for equipment, such as wireless, armament, etc., and the facilities for fitting this should not present any difficulties. Greater damage, without undue danger of collapse, may be permissible in a "shell" body than in a "frame" type of body, and repairs may be more readily effected.

As to weight, it would be a difficult task to make the *monocoque* body lighter than the faired rectangular frame. The shell type of body gives the impression of great rigidity compared with the frame type, and incidentally one wonders whether this has anything to do with the change over to *monocoques* in France, for in previous Shows the strut-and-wire type did not appear to be too strong torsionally.

In one respect, the Show was very disappointing, and that was in the number of details of construction on view. The Junkers Junior had the upper covering removed from the starboard wing, together with one-half of the body covering. A Bréguet was shown in the stripped state, and that was the lot, with the exception of the English exhibits. The Bristol Aeroplane Co., Ltd., Messrs. Armstrong Siddeley, and Messrs. Boulton and Paul definitely exposed to view all details of construction, and in the former cases, where complete aircraft were exhibited, the utility of the aircraft could be readily estimated by reason of the fact that the





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quantity, kind and accessibility of equipment could be closely scrutinised.

When these shows have greater commercial value, such display of the internal parts of aircraft will, of course, be essential for large sales, and although at this Show the constructors mentioned had their products pushed well out of the way, if the number of technical enquiries is any criterion, that factor did not affect the amount of interest displayed in them.

Needless to say, of the Continental exhibits, steel aircraft were practically non-existent: the Bréguet was the sole exception, although the C.A.M.S. had a steel spar on view (drawings of the spar sections are shown in Figs. 8 and 9, and another Continental effort at a metal spar is shown in Fig. 10).

The reinforcement of flat surfaces against secondary buckling, as by means of channels riveted on is quite effective, but corrugation is a lighter and cheaper means of attaining the same end.

(To be concluded.)

THE PROGRESS OF AERO ENGINE DESIGN AT THE PARIS SHOW

By CAPTAIN ANDREW SWAN, B.Sc., A.M.Inst.C.E.

Captain Andrew Swan, as many of our readers will probably know, is one of the Principal Technical Officers at the Royal Aircraft Establishment, Farnborough, where he is head of the Engine Department and in charge of the development and research work on engines. We count ourselves extremely fortunate in having been able to persuade Captain Swan to give us his impressions of the progress of aero-engine design as exemplified by the engines exhibited at the Paris Aero Show which closed a few weeks ago.

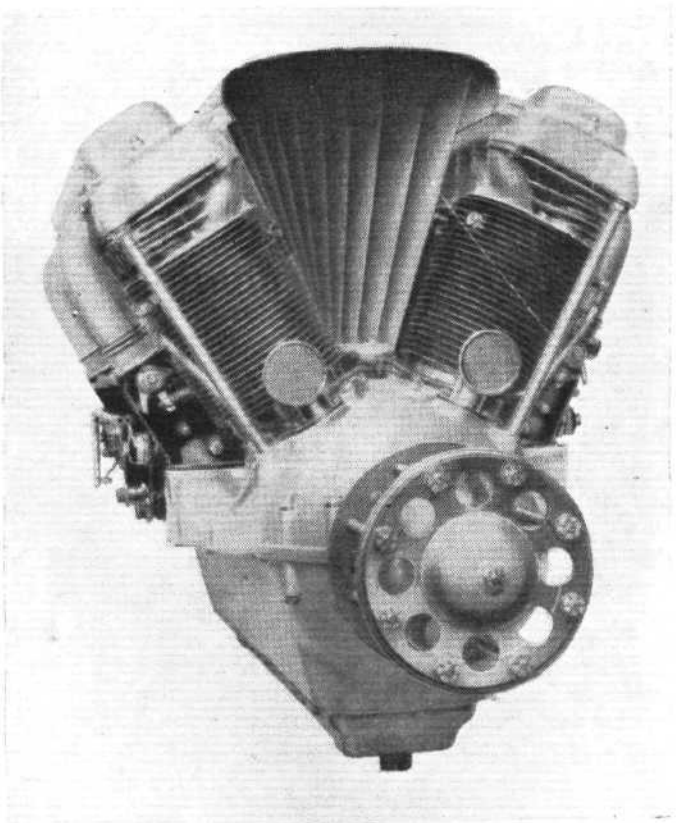
There was a large display of engines at the 12th Aero Show held in Paris, particularly by French engine builders who, in many cases, were showing examples of all their models. British constructors were well represented by Armstrong Siddeley, Bristol and Rolls Royce engines of the latest type, whilst Alfa Romeo, Fiat and Isotta-Fraschini (Italy), Argus, B.M.W. and Siemens (Germany), Elizalde (Spain) and Walter (Czecko Slovakia), were showing a fairly full complement of their products. No American engines were on exhibition other than the Hornet and Wasp radial engines manufactured on licence by Siemens.

Recent progress in engine design as typified by the engines exhibited is definitely along orthodox and well recognised lines, and any changes noted are more those of detailed improvement in the technique of design and construction or re-arrangement of accessories than actual departures of any importance from present principles and practice. By this it is in nowise intended to decry the progress shown, as it is fully acknowledged that the perfection of even the smallest detail, whether it be a point in design, or the adoption of a more suitable material, is of importance, and it is the combination of perfect detail from design to final construction which distinguishes the successful engine from its apparently similar brother.

In another category however, there are the compression ignition engines which are now making their appearance, namely, the Clerget nine-cylinder radial air-cooled engines of 100 and 200 h.p., and the Junkers 600 h.p. water-cooled six-cylinder opposed piston engine, of which some details will be given later.

It is proposed in the first instance to make a general survey of the engine types shown and to indicate, with some criticism, the present trend of development, leaving to the end any mention of details worthy of note.

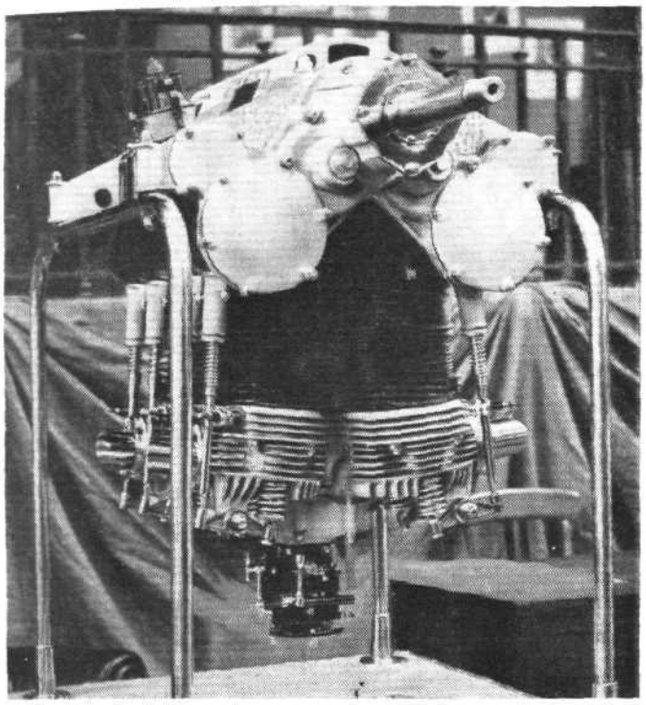
Air-cooled and water-cooled engines were about equally represented. Some makers, perhaps uncertain as to the future trend in this respect, make both types. Air-cooled engines, with few exceptions, were of the radial type, the single



The Isotta-Fraschini "Asso Caccia" is an air-cooled Vee type of 450 h.p.

row of cylinders being used for small and medium horse-powers, and the double row for the larger horse-powers. Two exceptions were the Asso 80 R six-cylinder in-line engine developing 100 h.p. and the twelve-cylinder Asso Caccia V-type developing 450 h.p., both made by Isotta Fraschini, who also make excellent water-cooled engines. The cooling air in the latter engine enters between the Vee of the cylinder blocks, and is divided and directed by baffles to pass across each cylinder. This engine is not a new type, but as far as is known has not been put into series production. The difficulties of adequately cooling the large cylinders of these engines by an air stream collected over a relatively small area are very considerable, and it would seem necessary to provide a greater flow of air by fan or other means. The air-cooled vee engine of 400-500 h.p. is attractive in that low frontal resistance would be obtained in addition to the elimination of the water-cooling system, but as forced or induced air cooling would appear to be necessary, much of the simplicity of the system would unfortunately be lost.

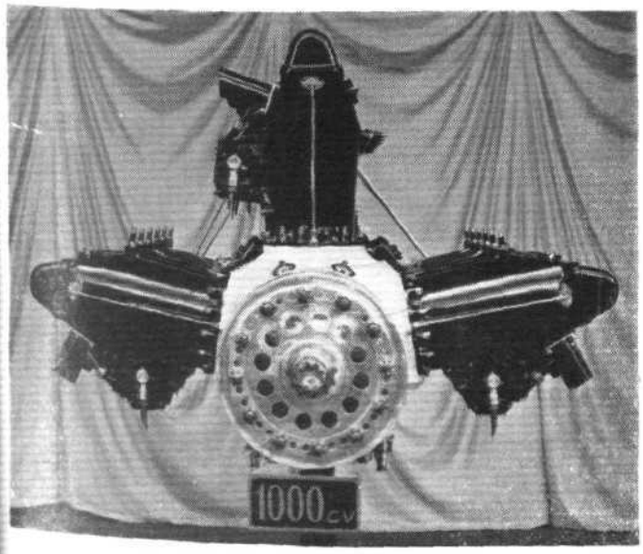
Another exception of special note was a small four-cylinder 100-h.p. engine by the firm of Chaise: Instead of the cylinders being in line, each pair, that is the first and third and the



The 100-h.p. inverted "Chaise" engine. (FLIGHT *Photo.*)

second and fourth cylinders, are set at a very small vee angle to one another so as to reduce the overall length of the engine and yet keep the frontal area small. The engine is inverted to give a clear view. The crankcase and cylinders are of cast iron, the cylinder heads of aluminium and the pistons of magnesium. The crankshaft is built up to permit the assembly of the connecting rods, which are carried on double roller bearings. Windows are fitted on the top of the crankcase cover so that inspection of the interior may be made. A feature of this engine is the elimination of all pipe work, except that for the petrol feed to the carburettor. No petrol or oil pumps are fitted, the lubrication being done by special cam throwers rotating in the crankcase and dipping into the oil reservoir. A distance of 2,000 km. is estimated on one replenishment of oil. A current of air for cooling the oil is arranged through the crankcase by means of breathers.

Water-cooled engines were mostly of the twelve-cylinder vee type. For very large powers the double vee arrangement of cylinders was used in three banks, each of four or six cylinders for the 12- and 18-cylinder engines respectively, but for small powers the single line of four or six cylinders was most common.

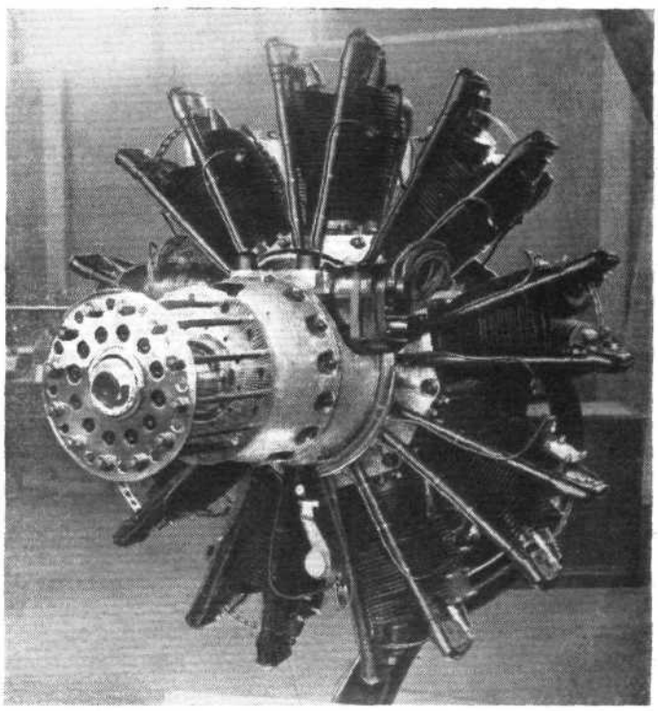


The 1,000-h.p. **Hispano-Suiza is of the "Broad Arrow" Type.** (FLIGHT *Photo.*)

An engine with a slightly unusual arrangement of cylinders, but at the other end of the scale from the Chaise engine as regards power, is the Hispano Suiza 18-cylinder, 1,000-h.p. engine. In arrangement it resembles the early Sunbeam Viking engine, and has three banks of six cylinders, each forming a very broad arrow, the angle between the banks being 80°. The balance is very good and the engine has an even firing order. The torque curve should be very smooth, due to the large number of cylinders employed. Nitrogen-hardened cylinder liners are used, and, in accordance with the firm's standard practice, three carburettors are fitted on the side of each block of six cylinders. It is stated that the engine gives more than 1,600 h.p. when naturally aspirated at a compression ratio of 10 to 1 and a speed of 2,400 r.p.m. (The Hispano Suiza Company is not yet seriously converted to supercharging, although one of their smaller engines is now fitted with a gear-driven centrifugal compressor.)

Recent experimental work in this country and elsewhere has indicated the possibilities of evaporative cooling, and also the use of high temperature coolants to reduce the radiator drag and give consistency of engine operation, but none of the water-cooled engines shown was stated to have been operated under either of these conditions, nor was there any suggestion that development work along these lines was proceeding.

Few inverted engines were shown, there being, besides the



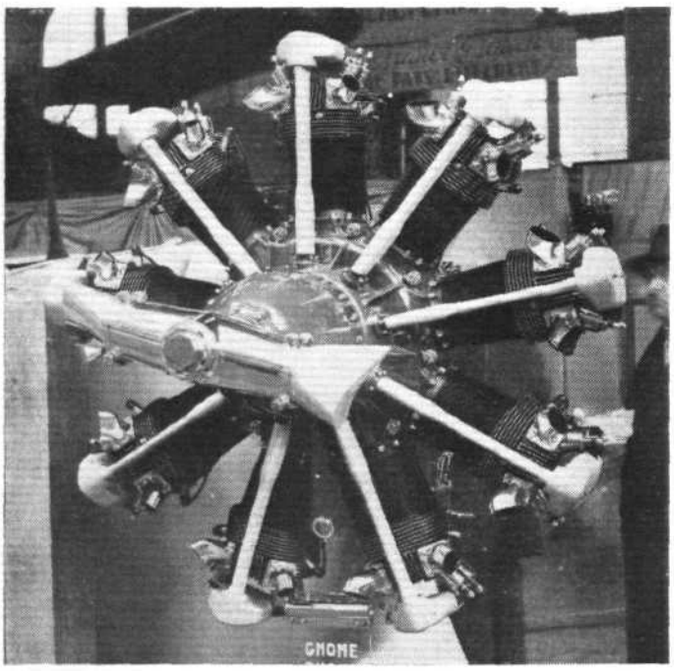
The 500-600 h.p Siemens-Halske S.H.20. (FLIGHT *Photo.*)

Chaise engine already mentioned, only the Farman eight-cylinder vee engine and the 12- and 18-cylinder double vee engines of respectively 350, 550 and 600 nominal horse-power. These engines are fitted with the well-known Farman reduction gear, so that the airscrew shaft is in line with the crankshaft. Inversion, therefore, gives the same freedom from obstructed view when installed in an aircraft, as would be obtained by the same treatment of a direct drive engine.

The necessity to ensure a clear view and at the same time to obtain an easily streamlined engine form is met in another way by the Rolls Royce series of engines. These are of the 12-cylinder water-cooled vee type, in which a straight spur wheel reduction gear is used to bring the airscrew shaft into a position practically central, looking from the front, with the whole engine. As the engine is particularly compact in arrangement, good streamlining can be obtained with no obstruction to the pilot's view and the difficulties attendant on an inverted design of engine are avoided.

As regards the choice between geared and ungeared engines, British constructors in many of their later designs are

definitely adopting the geared type; Farman engines are also geared, but many of the engines by other makers are of the direct-drive type, although an alternative geared type is sometimes available. The incorporation of a gear reduction to the airscrew would appear to be a wise step, in view of the higher engine-rotation rates now being sought and the relative inefficiency of the airscrew at these high speeds. The reduction in airscrew noise with the lower tip speed possible in the geared engine is also very appreciable, and particularly valuable for commercial transport.

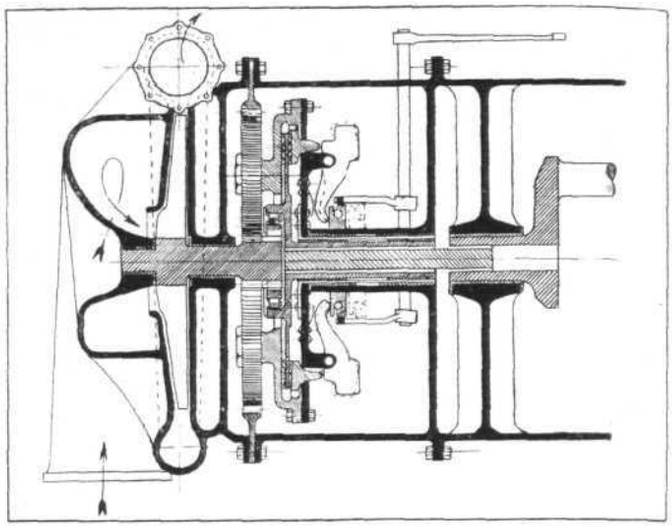


The Gnome-Rhone "Mercure." (FLIGHT *Photo.*).

The tendency to offer alternative gear ratios on engines is a noticeable feature. The Bristol Company were showing the Jupiter IX F and Mercury IV A and V A engines, all of the established Bristol nine-cylinder radial design, and each engine was fitted with a Farman reduction gear adapted to Bristol requirements. This gear in its simplest form gives a 0·5 gear ratio, and in a specially designed form it is now being made to give an alternative ratio of 0·656. The Rolls-Royce engines of the "F" and "H" series are all geared, there being three ratios available in the former series, namely, 0·632, 0·552, and 0·475. Straight spur gearing is employed throughout, and the crankshaft pinion is supported by roller bearings in a special manner to avoid transverse loads from the reduction gear affecting the crankshaft.

Of the wide selection of Armstrong Siddeley engines shown, the larger types—namely, the Jaguar, Panther and Leopard—can be fitted with reduction gear. The gear employed consists of a fixed sun wheel and five planet wheels meshing in an internally toothed ring driven by the crankshaft. The airscrew shaft is integral with the spider on which the planet wheels are mounted, and is therefore on the same centre line as the crankshaft. The Farman engines, both radial and water-cooled types, were fitted with their proprietary gear reduction, and several other engines by other makers—notably the Gnome Rhone engines, the B.M.W. 12-cylinder, 600-h.p. water-cooled V-engine, and the Siemens nine-cylinder air-cooled radial of 500 h.p.—were fitted with the same type.

Supercharging has now more advocates than formerly, many of the engines being made alternatively supercharged or unsupercharged. The supercharger employed exclusively is the high-speed centrifugal compressor, gear-driven by the engine. A division in this class is now becoming more general, in that to the category of supercharged engines with a full-throttle height of 10,000 to 12,000 ft. there is now being added a class with a smaller compressor to give a full throttle height of 3,000 to 5,000 ft.

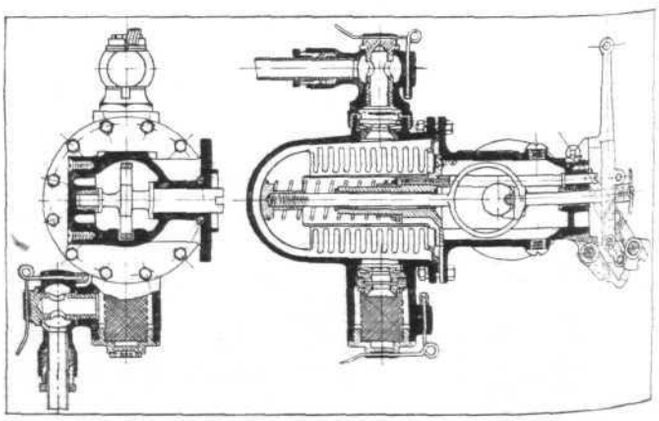


Section of Rateau supercharger.

The Rateau type of supercharger is fitted to the Farman engines, and in the drive is incorporated a plate clutch held in contact by the centrifugal force of suitably pivoted levers. Engagement is then smooth, and in addition the gear and impeller is not rapidly decelerated on shutting off the engine. The supercharger can be disengaged if it is desired to economise power when a supercharge is not required. On the Rateau stand were shown several superchargers of similar type, including an exhaust-driven one, but there was no engine with this latter type fitted.

To judge by the engines shown, the problem of supercharging to very high altitudes is not being given much attention, except that in one case a two-speed compressor is receiving consideration, so that by its employment the power lost by the normal centrifugal supercharger at low altitudes, when little or no compression of the air is required, may be reduced. Such a supercharger will then work in two stages, the low-speed gear operating for the first few thousand feet and the high-speed gear from there to full-throttle height. Of displacement blowers, which also have some benefit in economy of power at low altitudes, there was no example in any of the engines shown.

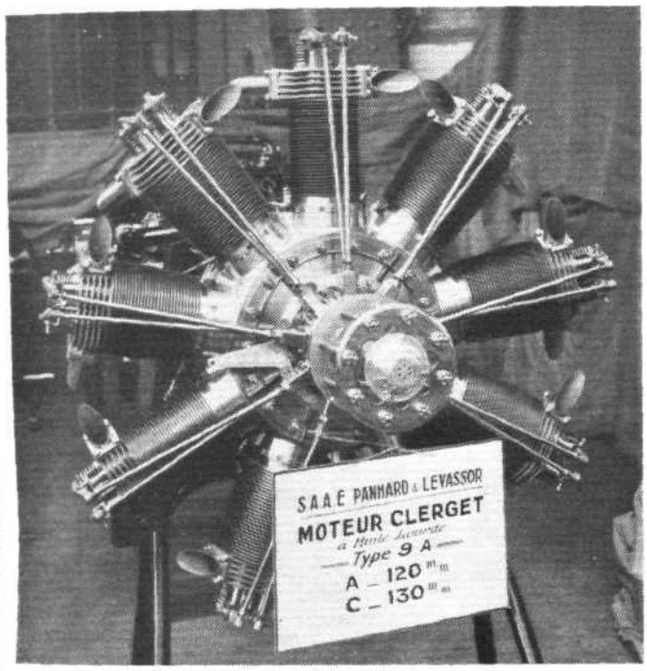
Minor points of note in the designs shown were the more common use of a geared fan, as has been used on Armstrong Siddeley engines for some time, to improve the charging efficiency and distribution to the engine; the provision for starting by hand turning and hand or electrically operated inertia starters, in addition to the standard gas starting; the fitting of an automatic ignition control and automatic boost control on the Bristol Mercury series of engines, and the provisioning on this same series for drives to other accessories, such as a generator, which may be later required; the general use of petrol pumps, the A.M. and Lamblin pumps being particularly favoured by Continental firms; and the tendency in many radial designs to place accessories such as the magnetos and fuel and oil pumps, in front of the engine.



Section of A.M. fuel pump, type 4.

This latter practice makes the accessories more accessible, and particularly in the case of the magnetos, avoids the difficulties experienced with a rear drive subject to the full amplitude of swing of the tail end of the crankshaft; but from the point of view of cleanliness and consequent reliability of operation the magneto is preferably placed at the rear of the engine where it is suitably protected.

On the newer engines there should be mentioned the Armstrong-Siddeley seven-cylinder radial Genet major of the same cylinder dimensions as the well-known five-cylinder Genet engine, and the two-row double Mongoose of ten cylinders



The Clerget compression-ignition engine. (FLIGHT *Photo.*)

based on the five-cylinder Mongoose of similar cylinder size. These two engines are of standard Armstrong-Siddeley design, and further the policy of this firm of making a complete range of horse-powers with a maximum of interchangeability of parts.

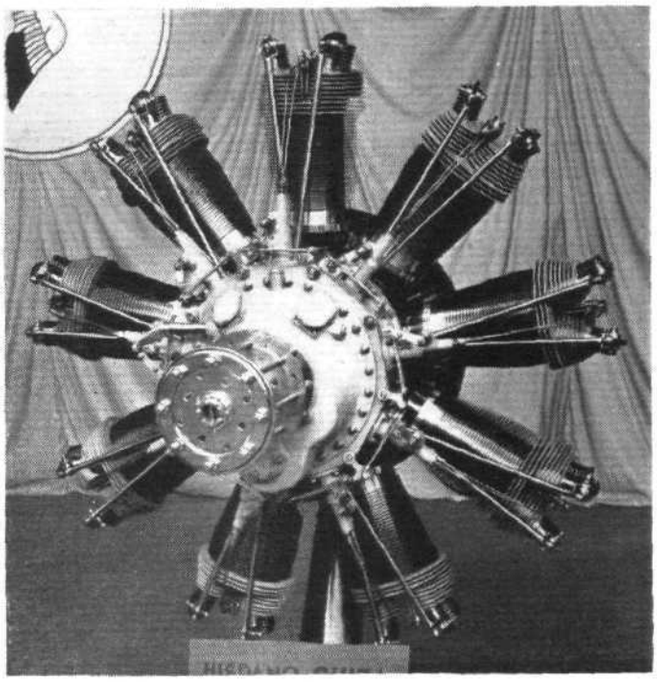
Other new engines are the Gnome-Rhone five-cylinder radial 240-h.p. Titan K, and the seven-cylinder 300-h.p. Titan Major. These have the same cylinder bore as the Jupiter engines made by this firm, but the stroke is reduced to 165 mm. The cylinder head is of cast aluminium and has two valves each of 75 mm. diameter; the compression ratio is 5·5. The valve gear is compensated for expansion, and the push rods are operated by a three-lobed cam driven by a small train of gears to obtain the required speed reduction. The crankshaft is split and held together by a pinch bolt only, and no floating bush is used on the big end although these are fitted to the small ends of the connecting rods. The engine can be fitted with geared fan or supercharger and can be supplied either with direct drive or Farman reduction gear. It is stated that the seven-cylinder engine has given an output of 420 h.p. at its maximum speed of 2,200 r.p.m. Nine and fourteen-cylinder engines of similar type are under consideration.

Of the engines shown by the Lorraine Company, the one of most recent interest is the twelve-cylinder Vee water-cooled 900-h.p. Eider. The design of this engine is compact and follows fairly orthodox but up-to-date lines, and the result is an engine of low weight/power ratio and small frontal area. The engine can be supplied geared and ungeared.

Mention should also be made of the Atlas engine, a nine-cylinder radial of 600 h.p. at a speed of 1,950 r.p.m., by the Walter Company, whose products have a high reputation. The cylinder dimensions are 165 mm. by 180 mm. stroke, and it is fitted with a two-valve cylinder head which indicates a large size of valve and consequent doubtful reliability. Otherwise the design is normal.

Compression ignition engines using heavy fuel oil were shown by Hispano-Suiza, Panhard and Levassor, Lorraine and Peugeot Aviation. The engines shown by the first three firms were of the types which were originally developed by Mr. Clerget under the auspices of the *Service des Recherches de l'Aeronautique*. Two sizes are made, one of 100 h.p. and the other of 200 h.p., and the design in each case is a nine-cylinder radial air-cooled engine fitted with a two-valve head. Each cylinder is supplied by its own fuel pump, and the fuel is delivered to a valve situated in the centre of the cylinder head. The Panhard model, which has flown several hours, develops 100 h.p. at 1,800 r.p.m. at 500 lb. weight, the bore and stroke being 120 mm. by 130 mm. The fuel pumps are placed behind each cylinder. The 200-h.p. engine as shown by Hispano-Suiza has a bore of 130 mm. and stroke of 170 mm., a compression ratio of 16 to 1, and at 1,800 r.p.m. it develops 225 h.p. The weight is 680 lb., giving a weight/power ratio of 3 lb. per b.h.p. The fuel pumps are fitted in front of the cylinders in this engine and are operated directly by a cam concentric with the engine crankshaft. The quantity of the fuel delivered by the pumps is controlled by a linkage connecting all the pumps to one common lever.

Peugeot Aviation were showing the Junkers type of compression ignition engine which is now manufactured by them on licence. This engine, developed by the Junkers Company over many years, is a six-cylinder opposed piston engine, there being twelve pistons, two in each cylinder, and two



The Hispano-Suiza heavy-oil engine. (FLIGHT *Photo.*)

crankshafts. The crankshafts are geared together by a train of spur gearing, and the airscrew shaft is positioned on the centre line of the engine. The cylinder bore is 4·72 in. and the engine speed 1,500 r.p.m. As the opposed pistons move apart and towards the end of the outward stroke, exhaust and inlet ports on the cylinder walls are opened, the exhaust being at one end and the inlet the other. Thus a good through scavenge is obtained by the scavenge air which is supplied by a gear-driven centrifugal compressor at a pressure of 4 to 5 lb. per sq. inch. On compression of the new charge of air the fuel oil is sprayed into the combustion space through two fuel valves on opposite sides of the cylinder. The horse-power developed is approximately 680 at a weight/power ratio of $2\frac{3}{4}$ lb.

Captain Swan has compiled an interesting table of data, not only of the engines shown, but of all the engines made by the various firms. Unfortunately lack of space compels us to hold this table over until next month—Ed.

TECHNICAL LITERATURE

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS

These Reports are published by His Majesty's Stationery Office, London, and may be purchased directly from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, W.C.2; 120, George Street, Edinburgh; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square West, Belfast; or through any bookseller.

TAIL FLUTTER OF A PARTICULAR AEROPLANE. By W. J. Duncan, B.Sc., A.M.I.Mech.E., and A. R. Collar, B.A., B.Sc. R. & M. No. 1247 (Ae. 401). (24 pages and 9 diagrams.) Price 1*s.* 3*d.* net.

In the course of a test flight of a particular aeroplane, violent rudder oscillations occurred, leading to fracture of the sternpost, and ultimately to destruction of the machine through crashing. The accident was considered both by the Accidents' Investigation Sub-Committee and by the Flutter Sub-Committee, and attributed to tail flutter. An investigation based upon the theory of tail flutter developed in R. & M. 1237,* was authorised by the Aeronautical Research Committee, and the present report is an account of this work.

The principal conclusions of the investigations theoretical and wind tunnel were as follows:—(*a*) The accident was due to tail flutter, essentially of the rudder-fuselage type; (*b*) Flutter would not have occurred if the rudder had been dynamically balanced (product of inertia zero); (*c*) Calculation indicates that flutter would even have been avoided in the present instance if the tail lamp and bracket had not been fitted to the rudder; (*d*) It is possible to eliminate the rudder compound damping by use of a horn balance without very close approach to aerodynamical balance of the rudder.†

* R. & M. 1237. "The Flutter of Aeroplane Tails," by R. A. Frazer and W. J. Duncan. January 1930.

† As pointed out in R. & M. 1237, very close approach to aerodynamical balance is, in certain circumstances, dangerous.

TORSIONAL VIBRATION OF CRANKSHAFTS—BEARDMORE "TORNADO" AIRSHIP ENGINE INVESTIGATIONS. By B. C. Carter, F.R.Ae.S., M.I.Mech.E., and N. S. Muir, B.Sc. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1303. (E.39.) (56 pages and 31 diagrams.) July, 1930. Price 3s.

From calculations made during the early stages of development of the "Tornado" engine for use in H.M. Airship R.101, it was inferred that serious torsional vibration would be experienced in the region of 950 r.p.m., the proposed normal speed, unless important modifications were made to the design.

A crankshaft torsional stiffness test was made to obtain more exact data for revised calculations. These gave substantially the same results as the original ones, i.e., that the main synchronous speed (fourth order, single node, major critical) would occur at 930 r.p.m. Stiffer crankshafts were put in hand, and meanwhile torsiograph tests were carried out on the first engine to be run with an airscrew fitted. The results confirmed the predictions made from theory, and failures due to torsional resonance occurred during the tests.

The matter of fitting a Lanchester damper and of fitting a spring hub were examined mathematically by the general methods described in R. & M. 1053.

The tests described in this report were made under a variety of conditions regarding the type of crankshaft, drive and airscrew fitted.

The torsional characteristics revealed by the torsiograph accord with those anticipated from theoretical considerations. The results of increasing the journal diameter from 5 to 5¾ in. was to raise the main synchronous speed from 930 to 1,000 r.p.m., thus reasonably confirming the calculated increase of 75 r.p.m. No appreciable difference was detected between the variable pitch and the adjustable pitch airscrews. Stiffening the crankshaft by adopting the 8½ in. wide webs had the effect of raising the main synchronous speed to 1,000 r.p.m. when a wooden airscrew was fitted in conjunction with a fixed hub.

The spring hub tests have revealed a degree of lowering of the main synchronous speed sensibly in agreement with the result appropriate to the particular stiffness, and the variation of torque is shown to become small at speeds beyond the main critical.

It is known that, with suitable design, solid friction damping can be made very effective in a spring hub, but with the hubs tested the substitution of "Ferodo" friction rings for the bronze thrust rings did not result in much damping.

A HARMONIC ANALYSIS OF THE TORQUE CURVES OF A SINGLE-CYLINDER ELECTRIC IGNITION ENGINE WHEN THROTTLED TO VARIOUS MEAN INDICATED PRESSURES, WITH AN APPENDIX ON THE ESTIMATION OF FORCING TORQUES IN MULTI-CYLINDER ENGINES. By N. S. Muir, B.Sc., and A. Terry, B.Eng. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1305 (E. 41). (13 pages and 11 diagrams.) March, 1930. Price 1*s.* net.

In the absence of a full Fourier analysis of the gas torque curves for a single-cylinder of a four-stroke electric-ignition engine, such as the "Liberty," throttled to various I.M.E.P.'s, it has not been possible accurately to calculate forcing torques, and thence the relative importance of the various orders of torsional vibration in the crankshaft of a multi-cylinder engine.

The present work has been undertaken to fill this gap, and the analysis has been made up to the twelfth harmonics of the cosine and sine components of the gas torque curves for a single cylinder of the standard "Liberty" engine.

Indicator diagrams corresponding to the engine conditions when throttled to various I.M.E.P.'s were deduced from an actual diagram taken at 1,600 r.p.m., with 5·3 : 1 compression ratio. The harmonic components of the corresponding gas torque curves have been evaluated for use in any subsequent work relating to torsional vibration of crankshafts or to engine dynamics generally. The inertia torques due to the connecting rod and reciprocating masses have also been considered, so that the resultant crank effort may be computed if required. In the Appendix there is outlined the manner in which the analysis is applied for estimating forcing torques in multi-cylinder engines.

THE AEROPLANE AS A SOURCE OF SOUND. By Morris D. Hart, M.Sc., LL.B., A.M.I.E.E., F.Inst.P., Barrister-at-Law. R. & M. No. 1310. (38 pages and 18 diagrams.) May, 1929. Price 1*s.* 9*d.* net.

Reference is made to previous literature on the subject which is not very extensive.

(i) Three reports by Messrs. Lynam and Webb. (R. & M. 624, 596 and 694.)

(ii) Two reports by Professor Bryan. (T. 1360 (unpublished) and R. & M. 684.)

(iii) Two reports on the vibrations of wires by Messrs. Harris (R. & M. 759) and Relf and Ower (R. & M. 825).

(iv) Two papers by Waetzmann, published in the "Zeitschrift für Technische Physik," 1921.

Other workers use various assumptions in developing their mathematical treatment.

As opposed to these methods the only basic assumption in the present paper is that in the case of a propeller which has no translatory motion the air at any point in its plane of rotation and at a distance from its axis not greater than the length of a blade is subjected to a periodic disturbance, of the most general character, due to the passage of the blades, and that the propeller so far as it produces the "primary" sound may be completely represented by the effects at all such points. This assumption has the advantage that the mathematical treatment based on it holds good irrespective of all considerations as to the nature, intensity and phase of pressures on the blade, interference between blades, the compressibility of the medium and other aerodynamical factors. For no matter how important and complex any or all of these factors may be, the resultant disturbance to which the air is subjected is none the less periodic with a period equal to the time elapsing between the passage of successive blades. It may therefore be represented with complete rigidity by a Fourier's series, since the form of the function must, of necessity, be single-valued, finite and continuous.

The author compares his results with those of experiments made to find the noise distribution round an airscrew as given in certain diagrams here reproduced. In general, the agreement is satisfactory. The author also discusses the question of designing a silent airscrew.

SOME APPROXIMATE SOLUTIONS OF THE BOUNDARY LAYER EQUATIONS. By V. M. Faulkner, B.Sc., and Sylvia W. Skan. R. & M. No. 1314 (Ae. 457). (35 pages and 21 diagrams.) April, 1930. Price 2*s.* net.

The investigations which have been carried out in recent years on the nature of the phenomena which occur in the fluid near the surface of a body placed in a stream, show the great progress which will be necessary before an adequate account can be given by the theory of fluid flow. Sufficient experimental work has now been completed to give a preliminary check on certain methods of attacking the problem, and to show on what lines further work may be expected to produce useful results.

A particular solution of the boundary layer equations is given for the case where the tangential velocity at the outside of the boundary layer is proportional to a power of the distance measured along the boundary from the stagnation point, and the results are presented graphically for a range of values of the index. It is shown that Blasius' solution for a flat plate is a particular case of this solution. A comparison is also made between the calculated and experimental values of the skin friction and the tangential velocity in the boundary layer for a plate, cylinder and aerofoil, and the agreement is found to be good on the whole.

THE BEHAVIOUR OF A SINGLE CRYSTAL OF ANTIMONY SUBJECTED TO ALTERNATING TORSIONAL STRESSES. By H. J. Gough, M.B.E., D.Sc., Ph.D., and H. L. Cox, B.A. Work performed for the Department of Scientific and Industrial Research. R. & M. No. 1323 (M. 69). (18 pages and 9 diagrams.) November, 1929. Price 1*s.* 6*d.* net.

As in R. & M. 1322, previous experiments on the failure by fatigue of single crystals of aluminium, iron and zinc, representing the face-centred cubic, the body-centred cubic, and the close-packed hexagonal lattices, respectively, have shown that failure of metallic single crystals tends to occur by slip on the plane of greatest atomic density in the direction of greatest (linear) atomic density. The results obtained with iron seemed to indicate that of the two factors, the linear density is the more important. In all three lattices, however, the *line* of greatest density lay in the *plane* of greatest density so that slip in the direction of the line of greatest density could always occur on the plane of greatest density and definite differentiation between the two factors was not possible. The structure of antimony (and also of bismuth), however, is such that the planes of maximum density do not contain any of the lines of maximum density, so that if the type of the slip plane were determined, definite evidence of the relative importance of the two factors would be obtained. The present experiment was designed to yield this evidence; but in so far as the results are inconclusive, it is hoped to obtain further evidence by a similar experiment on a single crystal of bismuth.

The specimen did not deform by "slip" and no slip bands were observed. A number of "fine lines" or cracks were, however, observed, which corresponded to the traces of planes perpendicular to the axis of trigonal symmetry; this plane, while not of the maximum atomic density, does contain the three principal lines of atoms, and hence might be expected to act as slip plane.

The twinning planes of antimony have been identified as of the 011 type. Twins were observed on all three planes (011, 101 and 110) of this type.

Owing to the fact that no definite slip bands were observed, the nature of the dependence of slip on the maximum linear and planar atomic densities could not be investigated.

THE SCHNEIDER TROPHY

IN our leading article we refer to the present position with regard to the Schneider Trophy.

The Times, in its issue of January 23, published the following letter from Sir Samuel Hoare :—

Sir,—It seems likely that in the press of Parliamentary business it will be difficult to find an immediate opportunity for discussing the amazing decision of the Government upon the question of the Schneider Cup. On this account, I venture to trouble you with the following observations.

The Cup, as every one knows, is the blue ribbon of the air. If it is won thrice in succession, the winner retains it and the competition comes to an end. Twice in succession we have won it by our skill, our dash, and our methodical preparations, and it seems certain that, short of some unforeseen accident, we should certainly win it a third time next summer. If this third victory came to us, we should have beaten every record in the air and have won the right to retain the Cup and end the contest.

Victories such as these are no mere stunts. They are much more even than speed records. They are the outward and visible sign of the surpassing excellence of British methods, designs, materials, and, above all, British pilots. Having been responsible for the preparations for the last two races, I can testify beyond fear of contradiction to the prestige and the goodwill that were established by our victories. When I went to the Air Ministry in 1922, the British aircraft industry was almost at its last gasp. Now, when every other industry is passing through a period of unprecedented depression, the export of our aircraft to foreign countries, already to be valued in many millions, is steadily rising. This change I mainly assign to the reputation that we have won for ourselves in foreign markets, and that we should not have won to the same degree without the resounding victories in the Schneider Cup race. Moreover, there is no doubt that our entry in the race has stimulated British design and has increased in many ways our technical flying skill.

Yet with all these manifest advantages accruing from a victory in the race, the Government not only refuse to find any money for it, but refuse even to let Air Force personnel and machines take part in it if the money is found by private subscription. The machines are in the possession of the Government, machines, it should be remembered, that are specially designed for the race. The pilots are there, already trained day by day for the very purpose in a special high-speed flight. The taxpayer will be put to no expense, for the money is to be found by private subscription. But the Government says no, and, true to its habitual practice, fumbles and wobbles between contradictory answers. A week ago it refused on the ground of expense. Now it is speaking of the bitterness that is stirred up by these international competitions. To what is due this sudden change of mind? I remember noting with satisfaction the Prime Minister's delight in the last race, and the pledge that he instantly gave that we should take part in it again. Why have these sudden qualms about international rivalries suddenly entered his mind?

Until I receive better answers to these questions than those of the Under-Secretary of State for Air in the House of Commons, I would hazard the conjecture that the Government decision is due to no serious reason at all, but to the utter want of imagination that has characterised almost every important decision that they have reached during the last 12 months. In the meanwhile, it seems a great pity that British aviation should suffer so needlessly from the dead hand of a stupid Government.—Your obedient servant,

SAMUEL HOARE.

January 22.

The next move came from the S.B.A.C., and the following letter, signed by the chairman, Mr. F. Handley Page, was sent to every Member of Parliament by January 25.

The Society of British Aircraft Constructors have noted with great regret the decision of His Majesty's Government that they cannot, either directly or indirectly, assist in defending the Schneider Trophy, won by Great Britain on the last two occasions, in the forthcoming contest. The society are well aware of the difficulties of the Government in the matter, and they appreciate that in the present state of the finances of the nation no economy however small can be neglected. It is, however, their experience that the British successes in the last two contests have given to British aviation and technique, both in aircraft and engines, a prestige in the minds of foreign buyers of aircraft that probably could not have been attained in any other way. That it has had an important influence on the foreign sales of British aircraft and engines is certain; and the society feel that the loss of the trophy by default must strike a serious blow at the export trade of the industry.

The cash cost of defending the trophy has been put at £80,000. What, however, has not been brought home to the public is that this £80,000, if spent, would, within the next few months be represented almost entirely by wages paid out to skilled workmen, who might not otherwise be employed. The net cost to the Government, therefore, in so far as it absorbs labour from the unemployed, must be substantially less if, indeed, the whole sum is not more than fully covered by the exceptional employment created in other directions by the actual holding of the contest. The society has already, in its conversations with the Royal Aero Club and the Air Ministry, undertaken onerous liabilities in the event of a British team defending the trophy in British waters; but only the Government has the personnel, equipment and statutory authority essential to the organisation of the course and the defence of the trophy. Both the foreign challenging teams have the full support of their respective Governments in regard to the provision of personnel and equipment.

On behalf of the Society of British Aircraft Constructors I respectfully invite you to urge the Government to reconsider their decision, approaching the problem in the light of the foregoing observations and on the grounds of the benefit to a new and growing British industry that participation in the contest—and especially success in the contest—would bring; and setting aside considerations of international competition except in so far as national success arms British industry against foreign competition.

This letter was followed up by one from the London Chamber of Commerce, signed by the President, Lord Herbert Scott, and also sent to every member of Parliament. Referring to the Schneider Trophy, the chairman wrote :—

The Chamber, which appreciates the vital importance of the development of aviation to this country and the Empire, views with dismay the present decision. It is realised that the great value in aviation is speed and that this country's successes in winning the Schneider Trophy have undoubtedly given a great impetus to the marketing of our aircraft abroad. The advertisement of British workmanship which we have received has enhanced the prestige of other industries generally.

It is specially regretted that this should have happened, in view of the magnificent success of the Italian flight across the South Atlantic and the imminence of the opening of the British Empire Trade Exhibition at Buenos Aires by H.R.H. the Prince of Wales, when every effort is to be made by British aircraft manufacturers to obtain a larger share of the South American market. It is accordingly hoped that you will see your way to support the motion inviting the Government to reconsider their decision.

In Parliament the following discussions took place on the subject.

CAPTAIN P. MACDONALD, on January 21, asked the Under-Secretary of State for Air if he can now state whether the Schneider trophy race is to take place in England in 1931; if so, where is it to be held and on what date; and if it is to receive the support of His Majesty's Government?

Mr. Montague: As recently announced, His Majesty's Government, after a full and careful review of all the relevant circumstances, have decided that there can be no departure from the policy promulgated in October, 1929. The answer to the third part of the question is, therefore, in the negative, and the first and second parts fall within the sphere of the Royal Aero Club.

Captain Macdonald: In view of the fact that machines are already available, and of the manifest effects that the winning of this race has had upon British aircraft development, will the hon. Gentleman undertake to reconsider this matter?

Mr. Montague: The subject has been considered for some considerable time—very thoroughly considered—and the answer is a final answer.

Lieut.-Colonel Acland-Troyte: Does the hon. Gentleman think it better to subsidise opera than to encourage British aircraft development?

Sir Philip Sassoon asked the Under-Secretary whether he is aware that without the Air Ministry organisation and co-operation it is impossible to compete for the Schneider Cup, which this country has but to win once again to make it its own; whether the offer of the Royal Aero Club to relieve the Air Ministry and the taxpayer of all expense in the matter, providing the Air Ministry would be responsible for the organisation of the race as in the past, has been considered by the Government and what decision has been come to and the reasons therefor?

Mr. Montague: The view stated in the first part of the question was put forward by the representatives of the Royal Aero Club in the discussions which took place last month. It was considered, together with other relevant factors—such as the representations made by the club as to their inability to find the necessary funds for the competition—by His Majesty's Government before arriving at the decision which I have just announced. With regard to the second part of the question, an offer to attempt to raise the necessary funds by the end of the month was made to the Air Ministry for the first time yesterday. This offer has also been considered by the Government. As, however, their decision against official participation in the race was not taken on grounds of finance only, but also for reasons of policy and principle, this offer does not enable them to modify their decision in any way.

Sir P. Sassoon: Is the hon. Member aware of the very serious effect a withdrawal at this moment from this contest will have upon our air position throughout the world, and also of the repercussion it must have upon our industry in this country, which, largely by virtue of our air supremacy in this very contest in the past, has shown a growing export business?

Mr. Montague: Those questions have been thoroughly considered not only by the Cabinet but also by the Air Ministry in conjunction with the right hon. Gentleman himself and the Royal Aero Club. Those points have been quite in our mind, and the decision is as I have announced.

Lieut.-Commander Kenworthy: Would my hon. Friend state briefly what are the reasons of policy, and is my hon. Friend aware that the question of policy is quite a new position and that in the past it has always been finance?

Mr. Montague: No, that is not correct. It has not always been finance. As long ago as October, 1929, and also in my Estimates speech, all those reasons were given. Questions of principle were involved. For instance, the consideration of whether it is desirable for the Government of the country to undertake responsibility for what was originally intended to be, and should be, a purely sporting contest.

Mr. Boothby: May I ask the Prime Minister as the head of the Government whether, in view of the new factor which has come to light and the offer made since yesterday, which surely alters the whole position, he would allow the matter to be reconsidered by the Cabinet, because, surely, the new offer puts the situation in a new light altogether?

Hon. Members: Answer!

Captain P. Macdonald: Is it not a fact that the Governments of other countries are being responsible for participation in this race, and why should this Government hold themselves above the Governments of other countries in this matter? Furthermore, is it not a fact that we have the machines available and that they are of no use for any other purpose?

Mr. Speaker: This matter seems to be developing into a Debate.

Sir P. Sassoon: In view of the unsatisfactory reply and the great importance of this matter to the country I beg to ask leave to move the Adjournment of the House for the purpose of discussing it as a definite matter of urgent public importance.

Mr. Speaker: I am afraid that I cannot possibly accept such a Motion. It certainly does not come under Standing Order No. 10.

Sir N. Grattan-Doyle: Cannot we have an answer from the Prime Minister?

Captain Macdonald: In view of the very unsatisfactory nature of the reply, I beg to give notice that I shall raise the matter on the Adjournment.

On January 26, Mr. SMITHERS asked the Prime Minister whether, in view of the fact that in September, 1929, he pledged the British nation to a continuation in the test for the Schneider Trophy, by assuring Italy that Great Britain would do her level best to win again, he would state the nature of the principle which now prevented the Government from officially supporting the contest.

Mr. MacDonald.—The construction which the hon. member seeks to place on my informal remarks on the evening of the contest in 1929 is quite unwarrantable. I was giving expression to the hope—which we all shared—that a British entry would be forthcoming for the next contest, and to enable such an entry to be organised the clearest possible intimation was given in the following month that the Government would not again be prepared to enter an official team. Neither of the two organisations primarily interested—namely, the Royal Aero Club and the Society of British Aircraft Constructors—made any representations to the Air Ministry until, more than a year later, the Royal Aero Club definitely stated they were unable to raise the funds or undertake the organisation necessary to defend the trophy. On this basis the Government again considered the matter, and decided that their previous policy must be maintained. This was communicated to the Royal Aero Club on the 15th of this month, and it was only on the 20th, nearly 15 months after the original announcement, that for the first time an offer was forthcoming to try to raise the necessary funds. Even then there was no guarantee that the necessary funds would be raised. In all the circumstances the Government could not regard this as justifying a reversal of their

previous decision. As regards the last part of the question, I would refer to replies given on January 21 and to the clear statement which appeared in the Press on the 16th inst. in pursuance of previous public announcements of Government policy in this matter.

Mr. Smithers asked whether he denied using the words quoted in the question, and would he say what principle prevented the Government from giving sanction to the contest?

Mr. MacDonald said he had already replied to the last part of the question. As to the first part he repudiated the interpretation put on his statement. A warning was given immediately after the statement was made so as to draw the attention of those interested to the fact that what he (Mr. MacDonald) had said was that he hoped that the British nation would enter into the contest, not the Government.

Replying to Commander O. Locker-Lampson, who asked whether the Prime Minister would receive a deputation upon the subject, Mr. MacDonald said that he wished that a deputation had been sent six months ago. Personally, he was keenly interested in this matter, and the Government waited for 15 months, but nothing was done. Now, at the last moment, without any preparation, he was asked to receive a deputation. He would be very glad to receive a deputation if any good could be done by such a course.

Mr. Hore-Belisha asked whether, if it were made plain that it was the wish of the House that the Government should support this contest, the Government would reconsider their decision.

Mr. MacDonald.—I hope before hon. members talk in that way they will consider the situation in which we find ourselves. I am as interested in this contest as any member, but I do not feel that the Government are to blame if no British team is entered.

On Tuesday evening, January 27, the Prime Minister received a deputation consisting of five members of Parliament, namely, Commander Locker Lampson, Sir Philip Sassoon, Capt. Balfour, Admiral Murray Sueter, and Mr. Malone. The question was fully discussed, and finally the Prime Minister said that he was willing to reconsider the matter and would make a statement in reply to a question on Thursday, 29th inst.

Lady Houston's Offer

LADY HOUSTON states that she has sent the following telegram to the Prime Minister :—" To prevent the Socialist Government being spoil-sports, Lady Houston will be responsible for all extra expenses necessary beyond what Sir Philip Sassoon says can be found, so that Great Britain can take part in the race for the Schneider Trophy."

CROYDON WEEKLY NOTES

WE have just completed another week of very erratic weather conditions, and although Croydon itself has been comparatively good, the weather outside has been very bad. Tuesday and Wednesday were very bad, especially on the continent, and several services were cancelled. On Wednesday afternoon not one single machine was able to get through to Croydon after 14.00, and all lines had to make Penshurst their terminal point for the night, except one Air Union machine, which managed somehow to get as far as Addington, which is about three miles from Croydon. He must have found it a tricky business finding a suitable landing place, and the field he did get into was far from ideal. To get out again it was necessary for a gang of men to push the machine to one extreme end of the field, and then hold on until the pilot got his tail up and the engines all out, before letting him finally go. Some uneasiness was felt during the gale on Wednesday night for all these machines were pegged out in the open. There were five at Penshurst and the one at Addington. However, they all stood the strain O.K. On Friday all services were cancelled, with the exception of the KLM and DLH. Saturday there was a decided improvement in the weather, except for strong winds, and all services flew to schedule.

Another sample of the sensationalist methods of the daily press was seen when they were giving the story of the Air Union " Liore," which forced landed at Smarden. Referring to the gold on board they gave a sensational account of how the guard were armed, and about the risk that was run and how they guarded the gold with their lives. Actually all that happened was that the steward informed Croydon of the forced landing, a car was sent to pick up the gold, which was brought to London and placed on the train for Paris. Naturally, precautions were taken, and members of the crew stood by waiting for the arrival of the car, but for the Press to make a " wild west " yarn out of it is ridiculous. Suppose anyone did manage to get away with a box of gold, what could he do with it ? He would not find a market for it, and he would need to be pretty muscular to walk off very far with a concentrated weight of 120 lb. in a heavy case.

Mr. O. P. Jones arrived at Cairo on Thursday with G-EBLO, and Mr. Rogers started with the second machine G-EBOZ on the 24th. One would very much like to know how Imperial Airways are going to fare on their European routes this summer. The third Argosy G-EBLF is scheduled for Africa on completion of overhauls. This leaves the company with only four Argosies, one D.H. 50, two W. 10's and the Westland 4. None of these can be hardly counted for the continental traffic, so actually they only have four Argosies in commission. They are no doubt banking on the HP. 42's being delivered, but judging by reports there is little or no hope of their delivery early this summer. I am not at all good at puzzles, and I should like to know how four Argosies are going to operate their summer European services. Unless a miracle happens one can see some very annoyed and disgruntled passengers. One can forecast delays of some hours on their services, and if one machine fails, what can prevent a hopeless chaos. In my humble opinion, " Imperial Airways " are trying to run before they can walk. It's all very nice to try and spread their tentacles over the whole empire, but they must get the flying stock first, otherwise their name will become a huge joke, instead of a household one. The travelling public will not be put out, as " Imperial Airways " will find to their cost unless they are very careful.

Mr. Campbell Black of the Wilson Air Lines, Nairobi, Kenya Colony, arrived in England on Wednesday on an Avro V. Like all the others, he was unable to reach Croydon, and had to land in a field at Nutfield, where one believes the machine got bogged. Up to the time of writing he has not been able to get the machine to Croydon. As is well known, he has made numerous trips from Kenya and back during the last few years, and seems to think no more of it than flying to Paris and back. These are the kind of flights that really show great commercial possibilities.

The levelling of the aerodrome still proceeds, and after many years of having the hump, the ground is getting quite good tempered. (Others should follow suit.) One does not hear any report of the old Roman road being unearthed, as it it reputed to run clean across the aerodrome from South to North, presumably the old Watling Street. Perhaps it will be as well to let it lay at rest, otherwise we should be overrun with white-whiskered old professors hunting for relics of the past, and absent-mindedly getting in the path of arriving aircraft.

One is glad to report that the epidemic of Croydon measles is slowly subsiding, and also that the gentlemen who wear berets or " ringworm caps " continue to sport them, although the famous yellow one has so far failed to appear.

Comdr. Kidston's Lockhead " Vega " has not yet been tested—the weather has been rather bad for such work at Croydon.

The traffic figures for the past week were : passengers 258; freight 29 tons.

P. B.

MODELS

THE MODEL AIRCRAFT CLUB (T.M.A.C.)

WILL Members please note that the Indoor Flying Meeting at The Horticultural Hall, Vincent Square, S.W., which was to be held on Wednesday, March 11, has been postponed to Thursday, March 12.

The Model Aircraft Club, in conjunction with The Sailplane Club, are holding a joint Dance at the Suffolk Galleries, Suffolk Street, Pall Mall, S.W.1, on Saturday, March 7, 1931, for the purpose of assisting the funds of the two clubs.

Members and friends are invited to apply for tickets as early as possible, price 2*s.* 6*d.* each, from the Hon. Secretary, A. E. Jones, 48, Narcissus Road, West Hampstead, N.W.6.

4th Wing, T.M.A.C., Hackney Marsh.—On Sunday, January 25, a gusty wind of about 35 m.p.h. prevailed all the morning. 12 fuselage models were successfully flown, however.

Thanks largely to assiduous practice in all weathers, members were able to get satisfactory trim, and launching confidently into the wind, obtained some very spectacular high flights, one low-wing machine landing far beyond the River Lea.

A large American-type " high-wing " gave a particularly fine display of wind fighting.

A certain amount of damage was inevitable, but the many good fights obtained were a great compensation.

AIRISMS FROM THE FOUR WINDS

R.A.F. Cairo-Cape Flight

THE three Vickers "Victoria" aircraft of No. 216 (Bomber) Squadron, R.A.F., under the command of Sq.-Ldr. H. W. G. J. Penderel, reached Tabora, Tanganyika, on January 23. They have thus concluded over half the journey to the Cape.

The Next Italian Formation Flight

ACCORDING to a report from Rio de Janeiro, the Italian Air Minister, General Balbo, has confirmed the news that the Italian Air Force will organise another Transatlantic formation flight—this time from Rome to New York. It is stated that the attempt will be made next year, probably in the new Savoia-Marchetti all-metal machines. The crews of the machines which made the recent flight to Brazil have left Rio de Janeiro for Sao Paulo for a week's visit. It may be of interest to note that Gen. Balbo sent the following message to the Works Staff of the Fiat Organisation at Turin :—"Fiat Works Staff Turin Squadron, Rio de Janeiro, 21 18 11/30. To the artisans who built our engines the grateful salute of the Atlantic Squadron. The engines have been faithful comrades. I am extremely satisfied."

A Round-the-World Flight

IT is reported that the American pilot, Bert Balchen, is planning a round-the-world flight in an effort to beat the time taken by the *Graf Zeppelin* in September, 1929. He hopes to start next April and will make his attempt in a Fokker machine. The *Graf Zeppelin* took 21 days 7 hr. 34 min. for the 28,000-mile journey from Lakehurst-Friedrichshafen-Tokio-Los Angeles-Lakehurst, and just over 20 days from Friedrichshafen and back.

Mrs. Victor Bruce Injured

WHILE taking off from Baltimore for Pittsburgh on January 27, the Hon. Mrs. Victor Bruce met with a slight mishap as the result of the wheels of her Blackburn "Bluebird" sinking in the boggy ground, causing the machine to turn over. Fortunately, Mrs. Bruce's injuries turned out to be slight, but the machine was damaged.

Miss Amy Johnson Takes a Holiday

MISS AMY JOHNSON has interrupted her flight home from Poland at Hanover, where she has stored her machine and gone to Switzerland for a week's winter sports.

Do.X. Ready for Atlantic Flight

REPAIRS to the German flying boat Do.X, the left wing covering of which was destroyed by fire on November 30, have now been completed. On January 24 and 25 successful trial flights lasting several hours were carried out at Lisbon.

Blackpool Air Pageant

THE proposal to hold a four days' aviation meeting at the Municipal Aerodrome in July, at a cost of £5,000, was the cause of a lively discussion at the Blackpool Town Council on January 7. Critics urged that, unless economy was practised, Blackpool was in danger of an increase in rates, and that aviation should be encouraged at the cost of the State, and not of Blackpool ratepayers. On the other hand, it was urged that the publicity obtained would be worth twice £5,000 to Blackpool. In the end, the proposal was adopted.

The Stockholm Aero Show

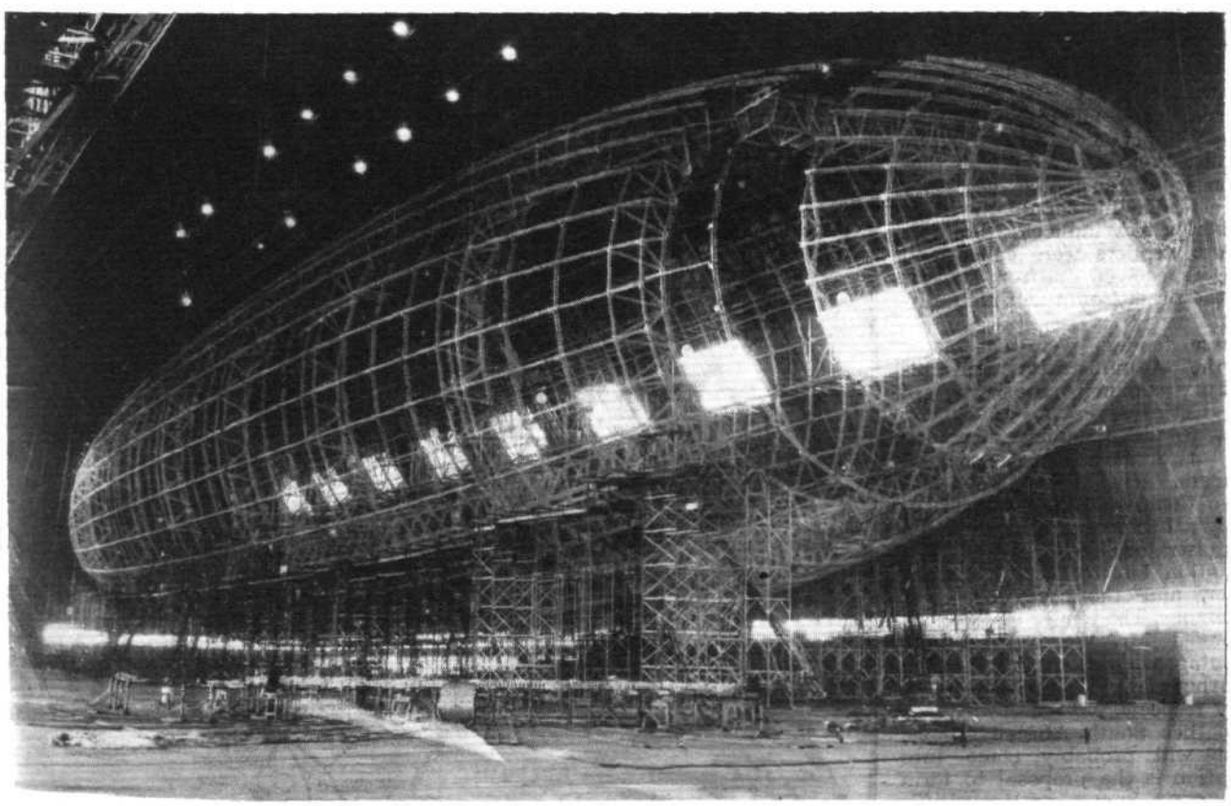
IT is now officially announced that the International Aero Exhibition, which was to have been held in Stockholm last year, but which had to be postponed, will be held this year, from May 15 to 31. The arrangements are identical with those planned last year, and include tent hangars for exhibitors who wish to have demonstration machines as well as those shown in the main exhibition hall. Applications for space must be made before February 1. All communications to be addressed to the Secretary, Internationella Luftfartsutställningen i Stockholm (I.L.I.S.), 33, Kungsgatan, Stockholm, Sweden.

Col. Lindbergh Decorated

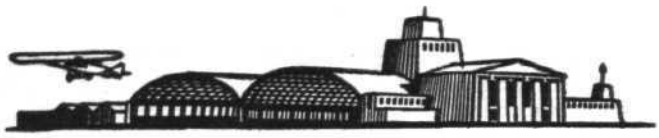
COL. LINDBERGH has been decorated by the French Ambassador in Washington, M. Paul Claudel, with the Cravat of Commander of the Legion of Honour of France.

Capt. Lundborg Killed

CAPT. EINAR LUNDBORG, one of Sweden's best-known pilots, who rescued Gen. Nobile after the *Italia* Arctic disaster in 1928, was fatally injured at Malmslatt aerodrome on January 27. He was testing a new Swedish-built military machine, and crashed from a height of about 150 ft.; he received serious injuries, and died shortly after reaching hospital.



AMERICA'S NEW RIGID AIRSHIP: The 76-ft. cone-shaped nose of the huge Airship "Akron," the largest airship in the world, being built for the Navy at Akron, O., by the Goodyear-Zeppelin Corporation, has just been placed in position, and now all that remains to complete the total length of 785 ft. of duralumin framework is the placing of the tail, which is to be added by February. After this, the work of putting on the fabric outer covering of the ship will begin.



AIR TRANSPORT

AIR TRANSPORT DEVELOPMENT IN AFRICA

APART from the inauguration of Imperial Airways' Cairo-Cape Town service, it would appear that we will see aerial activity in other directions in Africa this year. The East African Civil Aviation Co. has been carrying out investigations into the possibilities of a regular mail and passenger service, linking Dar-es-Salaam, Zanzibar, Mombassa, and Tanga. Experimental mail flights have, we believe, already been made in Tanganyika, while the question of feeder services to run in connection with the Imperial Airways Service is also receiving consideration.

Also, the Junkers Aircraft Corporation, of Dessau, has entered into a contract with the Administration of South-West Africa (formerly German South-West Africa) for a combined mail, freight and passenger air service between Windhoek and Kimberley, beginning April 1 next. The contract is for five years, and provides for the payment of an annual subsidy of £7,000 during that period. A company is being formed, known as South-West African Airways.

The service will be inaugurated by means of all-metal A50-type planes. Provision has been made in the contract for the use of larger aircraft if, and when, the volume of traffic warrants. The contract also undertakes to provide 'planes which will cover all parts of the territory. The Windhoek-Kimberley service will be flown in conjunction with the Imperial Airways trans-African service.

A certain amount of criticism, as might be expected, arose regarding the granting the contract to a German firm, in preference to a British or Union concern. In reply, however, the Administrator pointed out that the question is that South-West Africa is anxious to link up with the Imperial Airways in order to enjoy the benefit of aviation like every other civilised state in Africa. The benefits of fast mail and passenger service between Europe and Capetown is of primary importance to the progress of South-West Africa, and for that reason it is considered necessary that a feeder line should run from Kimberley to Windhoek. For this purpose, tenders were called and two were received, one from Junkers and the other from the Union Airways.

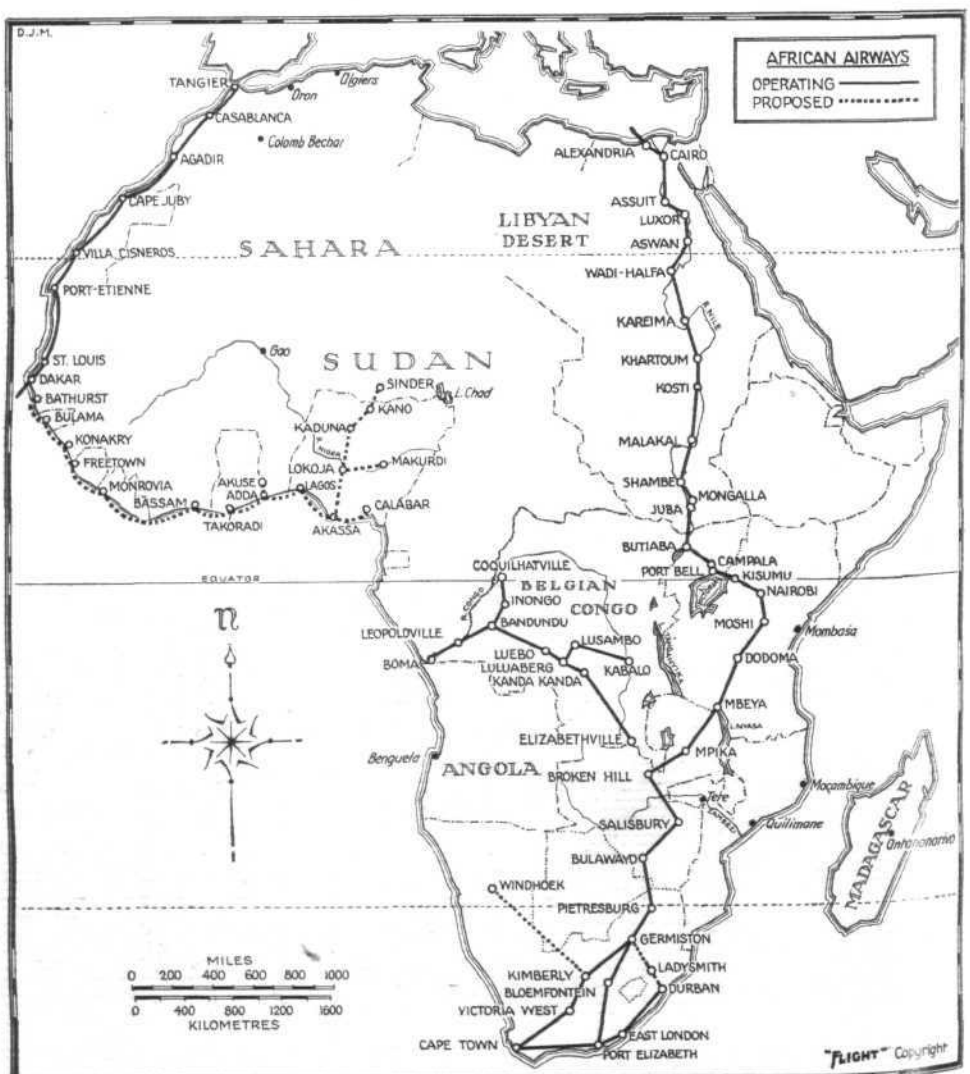
These tenders were considered by the Administrator and his Advisory Council, consisting of two German-speaking members, three English-speaking members, and two Afrikaans-speaking members. From the facts laid before them, and on the basis of purely a business project, both the Administrator and the Council had no option but to accept Junkers' tender, and the acceptance was unanimous. The tender of Junkers, continued Mr. Werth, was more advantageous to South-West Africa than that of the Union Airways, in many respects.

Another South African scheme which will probably come into operation is the proposal to form a company known as United Air Transport Co. of Cape Town. This concern intends to operate services between Durban, Johannesburg and Ladysmith district. It is stated that the company will control a fleet comprising two 10-passenger tri-motored machines, a 4-passenger survey machine, two 3-seater and five 2-seater machines. Before these services can be got going, however, facilities will have to be provided for aerodrome illumination, hangars, ground wireless installation, and improvements to Durban and other aerodromes.

New air lines in West Africa may also materialise, for Mr. W. A. Campbell, of the Civil Aviation Staff of the Air Ministry, recently visited the West African Colonies with the object of investigating the possibilities of air services in Nigeria, the Gold Coast, Sierra Leone, etc. He has prepared a report, and certain recommendations concerning the establishment of air lines on the West Coast have been submitted to the Colonial Office.

It appears that there would be little difficulty in establishing at once several air routes in these Colonies, linking up with French and Belgian air services. One, for instance, operated by flying boats, between Calabar, Nigeria, and St. Louis, Senegal—a distance of about 2,300 miles.

An inland route suggested was up the river Niger to Lokoja, thence to Minna, Kaduna, Kano and Zinder, where connection would be made with the Franco-Belgian service across the Sahara to Europe. In this case, amphibian machines would be suitable. A branch line from Lokoja, up the river Benue to Makurdi, is another suggestion.



This map of Africa shows the various spheres of aerial activity—in operation or projected—referred to in the accompanying article.

Mr. Campbell reported that there were good aerodrome sites in Nigeria, Gold Coast and Sierra Leone—especially for seaplanes. The section between Monrovia and Grand Bassam, over 500 miles, was the only long section which called for suitable intermediate ports of call.

France and Portugal are also considering a certain activity in Africa during this year. The French Aeropostale Co. has already established its service along the west coast to Dakar. M. Conty, Manager of the Compagnie Trans-Africaine d'Aviation, intends to inaugurate the France-Madagascar route this year with a service between France and the Congo, extensions being made later to Mozambique and Madagascar.

The route followed would be via Algiers, the Sahara, Niger, Lake Chad, through French and Belgian Congo to Mozambique, thence across to Madagascar. Three-engined Farman machines would be employed, and also Latécoère machines. M. Conty has been conferring with the Portuguese Aviation Co. regarding the question of air services in the Portuguese African colonies and from Portugal. It may be remembered that an agreement was recently made between the Lisbon Government and French and Portuguese air transport companies regarding the establishment of regular air services between France, Portugal, and their respective African Colonies. A great deal of spade work had already been done, and aerodromes had been fixed for service connecting France and the Congo. Planes would cross the Belgian Congo to Elisabethville, thus connecting with the Belgian air line. Broken Hill, Tete and Quilimane were other stopping places before the final stage of Antananarivo, Madagascar.

There are a few other instances of aerial activity in Africa—details of which are at present lacking, but it may be mentioned, in conclusion, that Mr. Alan Muntz, Managing Director of Airwork, Ltd., Heston, has been on a mission to Egypt regarding the formation of an Anglo-Egyptian company to promote civil aviation in Egypt.

It is proposed to organise regular services between Cairo and Jerusalem and Cairo and Aswan, each of which routes could be flown in 3 hr., instead of 15 hr. by train. Another service, by amphibian, would take passengers from homeward-bound ships at Suez to Cairo in 1 hr., instead of 3 hr. by car, as at present. The company would take a lease of the Almaza aerodrome, teach flying, and sell and repair aeroplanes, apart from maintaining the proposed services.

Thus, it will be seen, African aviation looks like being somewhat lively from now on.

Airports for Belfast and Dublin

WHEN the Parliament of Northern Ireland reassemble after the vacation, one of the first Bills to be brought forward for legislation is that of the Belfast Harbour Commissioners. The Commissioners are seeking to obtain statutory powers to levy a rate to provide revenue for the establishment of floating docks and bases for flying-boats and aeroplanes. The Commissioners will probably establish the aerodrome on a piece of reclaimed land, known as the Harbour Estate, which was to have been a National Flying Services Station, but as the offer made was too low, and Belfast business men did not advance the funds that were expected, the project fell through. The Bill has the support of some of the leading members of the Northern Parliament, and there is little difficulty anticipated in passing it through the House.

Action for the establishment of a civil aerodrome for Dublin has now reached a definite stage and a decision is expected from the Government in the course of the next few weeks, as to the adoption of the old military aerodrome at Collinstown, a few miles north of the city, as a municipal airport. The Civil Aviation Section of the Department of Industry and Commerce has prepared innumerable lengthy minutes on the subject, and the whole matter has reached the Executive Council of the Government. Our Irish correspondent learns that on the necessary approval being given, every effort will be made by the Department of Industry and Commerce to remove any petty annoyances that may have been caused to visiting pilots in the past, and pull up all the ground that the Free State has lost through its general attitude to flying. Strange as it may seem, Irish civil aviation is really in sound hands, but up to the present they have been badly tied; when they are freed we wish them every success and rapid progress.

A Hull-Grimsby Air Service

THE inauguration within a few months of a daily air service between Hull and Grimsby, was mentioned at a recent meeting of the Hull Development committee. Mr. Frederick Till, who presided, said the Air Sub-committee had considered what could be done in the way of experimental air services. They were not in a position to report fully, but progress had been made. An air service between Hull and Grimsby had been under consideration. A subsidy or a guarantee fund would be necessary at the outset, but with 40 passengers a day, at a return fare of 7s. 6d., the service would be a paying proposition. It was suggested that there should be six trips a day. The journey, including the time taken to travel from Hull to the municipal aerodrome at Hedon, would be 28 minutes, as compared with a steamer and train service of one and a half hours.

The Berlin-Nanking Air Line

As a result of recent negotiations, a Berlin-Nanking air service is expected to begin in March, and four aeroplanes have been shipped by the Lufthansa from Hamburg for delivery in Shanghai in February. The route will be via Tsinanfu, Tientsin, Mukden, Harbin, and thence across Siberia. It will be operated by the Euro-Asia Aviation Corporation, a Sino-German enterprise. The Shanghai-Hankow air mail and passenger service has been in operation for some time and a service between Nanking and Peking should by now also be running. We understand that the China National Aviation Corporation, which operates these services, possesses six amphibian machines.

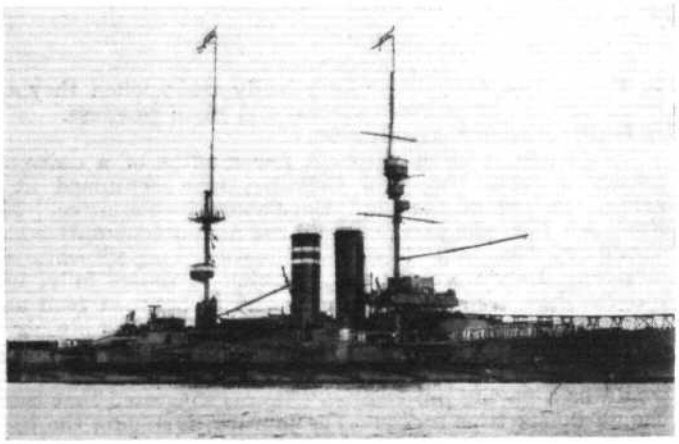
SOME PERSONAL FLYING SERVICES PERSONALITIES : Our picture shows Maj. I. N. C. Clarke (Chief Pilot), Capt. A. J. Styran (Pilot), and F. A. MaCoiser (Chief Engineer) of Personal Flying Services, Ltd., standing in front of three types of machines used by this air taxi company. These are a Desoutter, a Sikorsky S. 39 Amphibian, and a Junkers F.13 L monoplane. (FLIGHT *Photo.*)

DECK FLYING

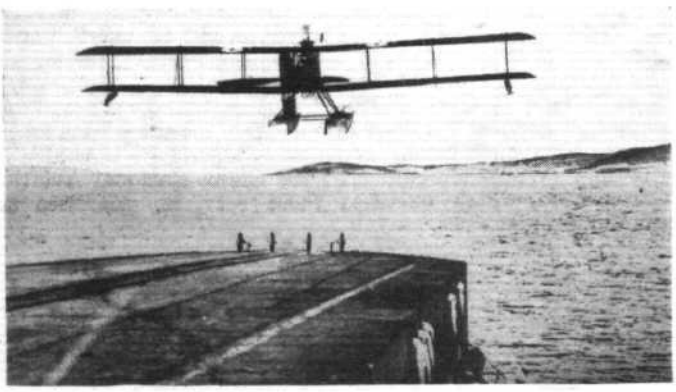
By SQUADRON-LEADER W. R. D. ACLAND, D.F.C., A.F.C.

The paper on "Deck Flying" read before the Royal Aeronautical Society on January 22 by Squadron-Leader W. R. D. Acland, D.F.C., A.F.C., proved an unusually interesting one, and was very well attended. Mr. C. R. Fairey was in the chair, and pointed out that this was an historic occasion as it was the first time the society had had a paper on Deck Flying. He recalled that Squadron-Leader Acland had spent a large proportion of his career in attacking the problems connected with deck flying.

A LECTURE on Deck Flying must include a good deal about carriers and the development of the seaplane carrier into the modern flush decked ship from which high performance aeroplanes can operate in almost any kind of weather, and as I believe this is the first occasion upon which a paper on deck flying has been read to the Society I propose to trace briefly the development of the modern aircraft carrier from the improvised auxiliaries commissioned to meet war exigencies.



The Battleship "Hibernia" was fitted, in 1911-1912, with a launching deck. (*R.A.F. Photograph, Crown Copyright.*)

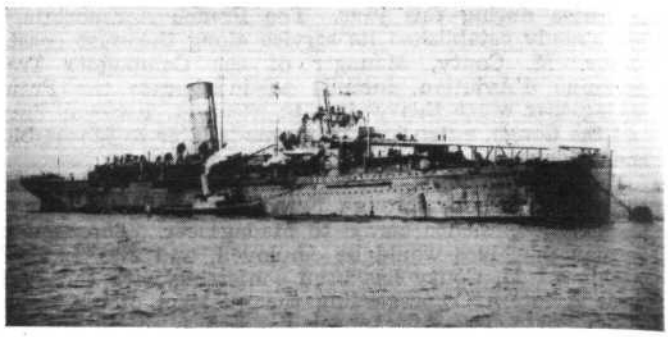


A Short Seaplane flying off the deck of the "Furious." Note that the wheels are arrested at the end of the deck. (*R.A.F. Photograph, Crown Copyright.*)

The design of the ship has throughout directly influenced the design of the aircraft until to-day a stage has been reached which within certain limits enables the fleets to use aeroplanes which are no longer hampered by extra strong undercarriages and appliances for picking up wires used with the original arresting gear, details of which I will describe later.

Before the war there were few aircraft with the fleet and the seaplane was the only type used in fleet manœuvres. As a type it was inefficient. It had to operate from shore bases and the sea was frequently too rough for machines to get off and alight upon.

The possibility of using land machines was, however, realised, and in 1911-12 the battleship *Hibernia* was fitted with a launching deck. This deck was a wooden superstructure built out from the bridge to the bows. Several



H.M.S. "Campania," fitted with forward deck nearly 250 ft. long. (*R.A.F. Photograph, Crown Copyright.*)

flights were made from this and a similar deck constructed on the *London*. All these flights were of an experimental nature only. The first carrier proper was the *Hermes*, commissioned in 1913.

The idea of flying off the deck was apparently not continued until 1915 and in the early stages of the war seaplanes and airships were the only aircraft available.

To accommodate seaplanes working with the fleet at sea, various merchant ships were at first fitted with more or less improvised arrangements and at intervals they returned to be improved until finally each of the vessels was fitted with a substantial hangar, workshops, etc. The *Vindex*, equipped with five seaplanes and two single-seater land planes, was the first ship to be fitted with a forward hangar and flying deck.

Thus the rapid development of the aeroplane for war purposes called this new type of ship into existence. It was soon realised that an improvised auxiliary was not efficient to provide the fleet with their needs in aircraft but the urgency had necessitated the adaptation of vessels already in existence.

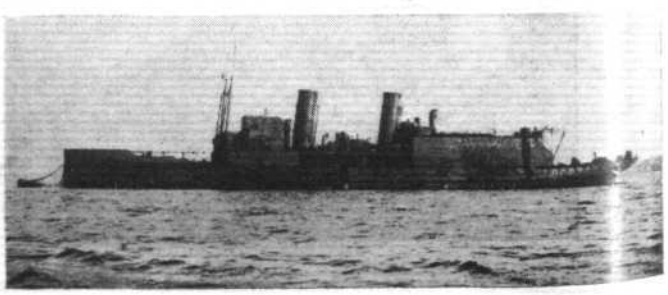
It was therefore the value of the aeroplane for reconnaissance, offensive action and fire control, which led to the demand for some kind of ship with a speed sufficient to enable her to accompany the fleet in action and to act as a carrier for the numerous fighting and reconnaissance aircraft required.

The seaplane carrier did not adequately meet these requirements. Very often conditions of the sea were such that it was impossible to get a seaplane into the air, and in any sea at all the carrier always had to stop or steam dead slow to pick up by means of a crane or derrick.

Special attention had been devoted to consider future developments on bigger lines as experiments had shown that aircraft had taken a definite place in naval warfare and that aeroplanes apart from seaplanes could be operated from ships at sea, a very important factor in view of the much better performance of aeroplanes.

The old Cunard liner *Campania* was therefore fitted with a deck nearly 250 ft. long and seaplanes were successfully launched from this deck in conditions under which it would have been impracticable to take off from the surface of the sea. An axle and wheels were attached to the underside of the floats and the aircraft was flown off like a land machine. As soon as it was in the air the pilot pulled a quick releasing device which allowed the axle and wheels to drop off.

Later an improvement was devised and used in the *Furious*. The seaplane rested on a trolley which ran down a slotted



H.M.S. "Vindex" was the first ship to be fitted with forward flying deck and hangar. (*R.A.F. Photograph, Crown Copyright.*)

rail fixed to the deck. On reaching the end of the deck the trolley was arrested by two arms fitted with shock absorbers. This method of flying seaplanes off got over the difficulty of getting aircraft into the air on a day when it would not have been possible to fly from the water, but it did not solve the problem of their return to the ship. The few land types carried in carriers and other ships had as yet no alternative but to alight on the sea after a flight out of reach of land. I do not propose to refer again to aircraft carried in ships other than carriers, as so far as flying off is concerned, there is in my opinion nothing to it other than opening up the engine, keep straight for 27 ft. or so, and trust to luck.

During the war single-seaters were carried and successfully flown from very short decks and in heavy ships both single and two-seaters were flown from turret platforms. In the case of the two-seater an extra long run was provided by placing boards across the guns, but all these platforms have, of course, now become obsolete, owing to the development of the catapult.

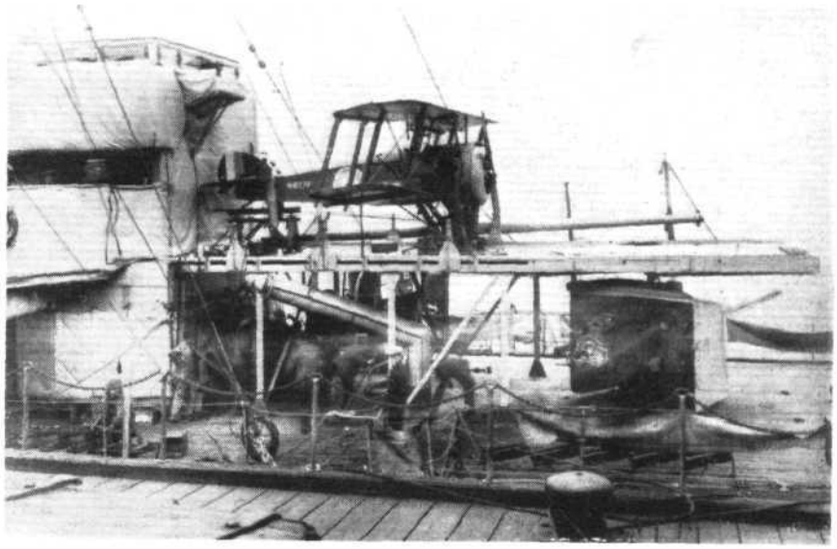
The *Furious*, first commissioned in 1917, was the first attempt at a floating aerodrome. By floating aerodrome I mean a ship to which landplanes may return after flight. In her first state only a comparatively small part of the ship was available for aircraft, and this was in the forward part of the ship. The flying deck consisted of the roof of the hangar extended to the bows and sloped downwards in order to give a clear flow of air over the deck. A run of over 200 ft. was available. It was on this deck that the first attempts to land were made. Here the late Squadron Commander Dunning made the first successful landing on a ship under way and lost his life in a subsequent attempt to improve upon this first achievement. The method adopted was as follows :—

The ship steamed head to wind so as to give as large a relative wind speed as possible. The pilot then flew past the ship as close as possible, drifted round the bridge and so arrived over the flying deck. He would then throttle down and allow the aircraft to sink on to the deck. There was no kind of gear to hold the machine on the deck once it was landed, but a party of officers and men were detailed to grab the aircraft as soon as it touched, and in the first successful landing it was actually caught hold of whilst still in the air.

Squadron-Commander Dunning realised that this was not practical and gave instructions that on his second attempt the aircraft was not to be touched until after he was on the deck. In thus attempting to arrive on the deck with his engine running he burst a tyre, with the inevitable result that in the high relative wind the aircraft dropped a wing and slewed over the side before it could be reached and the pilot was drowned.

The possibility of landing on a ship under way had, however, been demonstrated and it was due to the lessons then learnt that by 1920 landing on the deck was talked of as an everyday occurrence.

The *Furious* was sent in to dock to be fitted with a landing deck aft and experiments were carried out at the Isle of Grain with an arresting gear. This gear consisted of a number of fore and aft wires a few inches apart. At the forward end they ran over a sloping ramp. When landing was in progress the wires were supported 5 or 6 in. off the deck by small wooden blocks, thus ensuring that horns or hooks on the undercarriage engaged in these fore and aft wires. Stretched transversely across these wires at about 30 ft. intervals were ropes to each end of which was attached a bag of sand. The intention was that the pilot should let down a hook which would pick up successive transverse ropes as the aircraft ran down the deck, thus progressively increasing the drag and arresting the aircraft. The hooks or horns on the undercarriage engaging in the fore and aft wires kept the aircraft straight In practice our hopes were not realised.



A Sopwith "Camel" carried on a cruiser. It may be recollected that it was a "Camel" from a cruiser which brought down a Zeppelin. *(R.A.F. Photograph Crown Copyright.)*

Flying a Sopwith "Pup" off a turret platform. As the platform turned with the guns, it was not always necessary for the vessel to steam right into the wind. *(R.A.F. Photograph, Crown Copyright.)*

Squadron-Commander Dunning making his first landing (on a Sopwith "Pup") on the flying deck of the "Furious." *(R.A.F. Photograph Crown Copyright.)*

(To be concluded.)

THE MEOPHAM ACCIDENT

Technical Report by the Accidents Investigation Sub-Committee of the Aeronautical Research Committee

THE official report on the accident to the Junkers aeroplane G-AAZK at Meopham, Kent, on July 21, 1930, has now been issued as R. &.M. No. 1360, and is obtainable from H.M. Stationery Office, the price being 5s. 6d. net.

The Report indicates the extremely thorough nature of the investigations made into this accident, and, in the view of the Accidents Investigations Sub-Committee, the primary cause of the accident was due to a phenomenon to which has been given the name " tail buffeting," which is an irregular oscillatory movement of the tail unit experienced on certain aeroplanes when the wing incidence is large. " Buffeting " is attributed to the eddying wind from the wings, and in contrast to flutter as ordinarily understood there is no definite critical speed at which buffeting commences. As a rule, with a given angle of incidence, the violence of buffeting increases with the air speed.

The Report suggests that although the combination of high speed and high angle of incidence can only occur in flight temporarily, and cannot be maintained for many seconds at a time, it is possible that in cloud, due to up-currents and turbulence, the attitude of the aeroplane became such that violent " buffeting " set in. In the opinion of the Sub-Committee the tail plane was thereby broken and the other breakages resulted.

The Report deals briefly with a certain number of plausible explanations of the accident, eight of which are briefly dismissed. The theories thus dismissed are as follows : (a) That the engine cowling became unfastened, blew back and obscured the pilot's view. This is considered to be disproved by evidence furnished by an examination of the wreckage. (b) That an air-screw blade was damaged in the air to result in an unbalanced force being applied to the aeroplane sufficient to tear the engine from its mounting. Examination showed that the blades had not moved in their fastenings during flight, and that the breakage occurred after the engine had struck the ground. There was evidence, the Report states, that the engine was rotating at the moment of impact. (c) That the wooden bearers under the engine failed first. This also is regarded as being disproved by evidence. (d) That there were defects in material. This is disproved by an examination of the structure. (e) That there was incorrect assembly. As a result of an examination of the parts of the wreckage, no defect of material or workmanship was found which could have contributed materially to the failure of the structure. (f) That the wings had been removed for examination in England and incorrectly assembled. This theory is disposed of by the fact that the machine was erected in Germany, delivered to this country by air on May 29th, and was not subsequently dismantled. (g) That the aeroplane was damaged while it was pegged down in the open at Berck. There is no evidence of weakening of the fuselage or tail skid prior to the accident. (g) That an explosion occurred in the aircraft, due to the ignition of petrol vapour or other cause. This theory is dismissed because there were no signs of burning or singeing, no inter-penetration of parts of the structure, and no series of breakages radiating from a centre.

One other theory the Report examines and does not dismiss quite as definitely as the above eight, namely that the primary cause might have been wing failure due to a too rapid pull out from a dive. The Report states that tests made showed that, unless the speed of the aeroplane exceeded 134 m.p.h., it would be impossible for the pilot to cause breakage of the wings by abrupt use of his elevator control. He would, therefore, have first to permit the aircraft to pick up sufficient speed, and then to flatten out suddenly. This manœuvre, the Report states, the pilot would be most unlikely to attempt at a height of 1,500 feet. A violent vertical gust might also have broken the wing, but the Sub-Committee considers that an explanation is necessary as to how the tail could have been subsequently broken in the air. It is pointed out that investigations into the strength of the machine showed that, in flattening out, the wings would have broken before the tail, and the Sub-Committee is of the opinion that an undamaged tail could not be wrenched from the fuselage in the air after one wing had failed. The evidence, however, definitely indicates that the tail did fail in the air, and the Report points out that in many years' experience of accidents in which an aeroplane has broken up in the air, the tail has either broken first or has come down intact with the main structure. This, the Report states, is in accordance with an analysis made by the Inspector of Accidents of all accidents in Great Britain during the past ten years.

Although, in a letter addressed by Sir Richard Glazebrook, Chairman of the Aeronautical Research Committee, to the Secretary of State for Air, Sir Richard states that the exact sequence of events after the tail was broken by " buffeting " was not quite clear, the Report gives a suggested sequence of events as follows :—

" The port tailplane extension broke upwards as a result of " buffeting," consequent on high incidence produced by air bumps, and folded backwards on to the port elevator. The elevators were forced down, and, in spite of any efforts by the pilot, the aeroplane dived sufficiently to reach a speed in excess of the 135 m.p.h. below which the wings of this aeroplane cannot be broken. The damaged port tailplane extension produced failures in the elevator, and both parts broke away from the aeroplane and fell considerably to the east of the main masses of wreckage.

" The tail unit now damaged and bent, would probably flutter ; this would give rise to large forces, and thus bring about the separation of the tail and the fuselage. On the other hand, it might have been twisted off, due to previous damage, at a relatively late stage during the final dive. The aeroplane moving at a high speed must have reached a stalling attitude, thus stressing the wing structure beyond its breaking limit and fracture occurred.

" In the last paragraphs the Sub-Committee have not dealt with the steps by which the engine was torn from the aeroplane. According to the evidence, this would need a somewhat greater acceleration than that required to fracture the wing, and it is difficult to see how this would have been produced after the wing had broken. The circumstances of the accident make it clear that the aeroplane was subjected to a rapid angular acceleration, tending to raise the nose, the effect of which, superposed on that due to the forces on the wings, might have been sufficient to break the engine supports. The considerations will not, however, affect the conclusions of the Sub-Committee as to the probable primary cause of the accident.

" In putting forward buffeting as the primary cause, the Sub-Committee have taken into consideration the fact that no previous accident has been attributed to this cause. In spite of this they are unanimously of the opinion that this explanation is the only one yet put forward which is consistent with the evidence."

◈ ◈

Death of Mr. Montague Napier

WITH great regret we have to record the death on January 23, at Cannes, France, of Mr. Montague Stanley Napier, aged 60, chairman of D. Napier and Son, Ltd., of Acton. The late Mr. Napier was a grandson of the founder of the firm which bears his name. The firm first started work on the Clyde, but in the middle of last century moved to London. From general engineering it came to specialise on motor cars, and afterwards on aero engines. Mr. Montague Napier, who was himself a sound engineer, guided his firm through its last change of occupation, and saw the famous 450-h.p. " Lion " become a success. Then his health broke down, and he was ordered by his doctors to live in the sunny climate of the Riviera. But when any important new departure was taken—as, for example, the designing of the 1,000-h.p. " Cub "—the chief designers of the firm would travel to Cannes to consult with the chairman. Those who knew Mr. Napier have testified to the great charm of his character, and by them in particular his death will be deeply deplored.

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The Short " Kent "

WORK is progressing apace at Rochester, and the first of the four-engined flying-boats which Short Brothers are building for the Mediterranean section of the England-India and England-Africa air routes is nearing completion and will probably be launched within the next three or four weeks. The stainless steel planking of the underwater portion of the hulls is a joy to behold, " fair " curves being evident everywhere. The new machines, by the way, will be known as the " Kent " type.

THE ROYAL AIR FORCE

London Gazette, January 20, 1931.

General Duties Branch

Group Captain E. D. M. Robertson, D.F.C., is appointed Air Aide-de-Camp to the King (Jan. 1) (vice Air Commodore R. P. Ross, D.S.O., A.F.C.).

The following flight cadets having successfully passed through the R.A.F. College, Cranwell, are granted permanent commns. as Pilot Officers with effect from and with seny. of Dec. 20, 1930:—W. S. Reed, R. T. Cazalet, F. A. Pearce, W. F. C. Hobson, J. P. Cecil-Wright, H. T. Bennett, T. Q. Horner, C. S. Moore, T. N. Coslett, J. C. Macdonald, H. Eeles, C. M. Windsor, H. A. V. Hogan, M. W. S. Robinson, H. P. Broad, L. G. Belchem, R. C. Gaskell, M. W. L'I. La V. Baker, R. L. Wilkinson, R. F. Smith, N. E. Morrison, J. S. Sabine, G. R. Moorby.

The following Pilot Officers on probation are confirmed in rank :—E. Elgey, C. J. Farrell, G. J. Holland (Dec. 27, 1930) ; A. W. R. Lawson (Jan. 6). The following Pilot Officers are promoted to rank of Flying Officer : H. D. Primrose (Aug. 22, 1930) ; W. M. L. MacDonald (Oct. 14, 1930) ; G. Calvert, C. H. Glover, D. H. A. Golege-Steel, A. H. Houghton, G. M. Ievers, F. J. B. Keast, D. W. Lydall, I. L. S. McNicol, J. T. Mynors, B. Paddon, H. G. J. Purcell, N. Stratton, J. M. Waddell, S. N. Wiltshire (Dec. 28, 1930) ; E. C. Bates, G. S. Coleman, H. O. Woodhouse, R. W. H. Harrison (Jan. 1).

Pilot Officer E. C. W. S. Smith is promoted to rank of Flying Officer, with effect from Jan. 15 and with seny. of Dec. 17, 1930 ; Flying Officer L. H. Anness, A.F.C., is transferred to Stores Branch on probation (Jan. 9) ; Flying Officer J. H. L. Dillon-Trenchard resigns his permanent comm. (Jan. 21).

The following Flying Officers are transferred to Reserve :—CLASS A. P. S. Cook, F. Gower-Jones, C. S. John, A. F. Merritt, W. J. Pickard (Jan. 16). CLASS C.—J. E. McC. Henderson (Jan. 6) ; D. J. R. Hylton (Jan. 17).

Flying Officer F. Townsend relinquishes his short service commn. on account of ill-health (Jan. 17). The following Flying Officers relinquish their short service commns. on transfer to Royal Australian Air Force Reserve (Jan. 17) : —E. H. Irving, A. A. Koch, G. Selk. Comdr. L. C. Sharman, R.N., Flight-Lt., R.A.F., relinquishes his temp. commn. on return to Naval duty (Jan. 13) ; Pilot Officer G. R. Warner is dismissed the Service by sentence of General Court Martial (Jan. 14).

Stores Branch

The following are granted permanent commns. as Pilot Officers on probation with effect from and with seny. of Jan. 9 :—J. R. Fraser, J. E. Shrimpton, H. A. Sudbury, E. G. Moore.

202020 Warrant Officer 1st Class J. T. Brown is granted a permanent commn. as Flying Officer on probation with effect from Jan. 7, and with seny. of Jan. 5 ; Flight Lt. N. Robertson is placed on retired list on account of ill-health (Jan. 20).

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

J. Sim is granted a commn. in Class A.A. (ii) as a Pilot Officer on probation (Jan. 5) ; Pilot Officer H. Clive-Smith is promoted to rank of Flying Officer (Jan. 1) ; Flying Officer R. K. Coupland is transferred from Class A to Class C (Jan. 9).

The following Flying Officers relinquish their commns. on completion of service :—H. N. V. Le Noel, D.F.C. (Dec. 5, 1930) ; C. C. K. Dagg, A.F.C. (Dec. 23, 1930).

Stores Branch

Flying Officer E. J. Newman, M.B.E., relinquishes his commn. on completion of service and is permitted to retain his rank (Nov. 11, 1930).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Air Marshal Sir Robert Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C., to Special Duty List, on appointment as Commandant of Imperial Defence College ; 19.1.31.

Group Captain A. ap Ellis, C.B.E., to No. 5 Flying Training School, Sealand ; to command 22.1.31.

Wing Commanders : P. C. Maltby, D.S.O., A.F.C., W. A. McClaughry, D.S.O., M.C., D.F.C., D. G. Donald, D.F.C., A.F.C., all attending course at Imperial Defence College ; 19.1.31. E. J. P. Burling, D.S.C., D.F.C., A.F.C., to R.A.F. Depot, Uxbridge, while attending Sen. Officers' (Army) Course, Sheerness ; 19.1.31. K. R. Park, M.C., D.F.C., to Station H.Q., Northolt ; to command 19.1.31. R. M. Bayley, D.F.C., to Air Ministry (D.O.S.D.), for Air Staff duties, ; 22.1.31. E. L. Tomkinson, D.S.O., A.F.C., to R.A.F. Depot, Uxbridge, on transfer to Home Estab. ; 12.1.31.

Squadron-Leaders : J. S. T. Fall, D.S.C., A.F.C., to Station Flight, Andover ; 8.1.31. F. H. M. Maynard, A.F.C., and J. J. Breen, both attending course at Imperial Defence College ; 19.1.31. W. R. Cox, M.C., A.F.C., to H.Q., Inland Area, Stanmore ; 7.1.3.1. W. Underhill, D.S.C., to No. 10 Sqdn., Upper Heyford ; 23.1.31.

Flight-Lieutenants : E. S. Moulton-Barrett, to No. 204 Sqdn., Mount Batten ; 6.1.31. S. H. V. Harris, to No. 23 Sqdn., Kenley ; 20.1.31. T. W. S. Brown, to No. 1 School of Tech. Training (Apprentices), Halton ; 17.1.31. J. M. Mason, D.S.C., D.F.C., to No. 503 Sqdn., Lincoln, 22.1.31. H. Thomas, to No. 3 Flying Training School, Grantham ; 17.1.31. W. M. C. Kennedy, to R.A.F. Depot, Uxbridge ; 13.1.31. H. C. V. Jolleff, to No. 9 Sqdn., Boscombe Down ; 19.1.31.

Flying Officers : J. F. McKenna, to No. 503 Sqdn., Lincoln ; 8.1.31. E. J. H. F. Moreton, to No. 32 Sqdn., Kenley ; 15.1.31. G. V. Carey, to Central Flying Sch., Wittering ; 20.1.31. M. J. Du Cray, to No. 55 Sqdn., Hinaidi ; 10.12.30. T. L. Harrison, to No. 70 Sqdn., Hinaidi ; 12.12.30. D. T. Saville, to R.A.F. Base, Calshot ; 13.1.31. G. R. Jackson, to R.A.F. Depot, Aboukir ; 29.12.30. L. W. Howard, to No. 99 Sqdn., Upper Heyford ; 14.1.31. F. Whittle, to Marine Aircraft Experimental Estab., Felixstowe ; 12.1.31.

Pilot Officers : E. J. P. Davy, to No. 84 Sqdn., Shaibah ; 12.12.30. The following are all posted to No. 2 Flying Training School, Digby ; 10.1.31 :—R. G. C. Arnold, R. J. Bennett, E. R. Berry, H. G. Blair, G. E. O. Browne, W. D. Dennehy, V. P. J. G. Doherty, E. A. Douglas-Jones, J. J. A. Ellison, W. R. Farley, E. D. Green, H. Harkness, G. Hinckley, I. V. Hue-Williams, G. T. Jarman, G. L. C. Jenkins, E. D. Redgment, R. C. Richmond, N. P. Samuels, F. C. Seavill, F. A. A. H. Strath, C. Tapley, F. S. Wakeham, J. M. Warfield, O. P. E. Williams, R. G. Whitehead, J. M. Wilson, R. I. B. Winn.

The following are posted to the Units shown on appointment to Permanent Commns. from the R.A.F. College, with effect from 20.12.30 :—T. N. Coslett, C. M. Windsor, to No. 2 Sqdn., Manston ; R. L. Wilkinson, G. R. Moorby, to No. 3 Sqdn., Upavon ; N. E. Morrison, to No. 13 Sqdn., Netheravon ; L. G. Belchem, to No. 19 Sqdn., Duxford ; H. P. Broad, M. W. L'I. La V. Baker, to No. 26 Sqdn., Catterick ; R. C. Gaskell, to No. 33 Sqdn., Bicester ; C. S. Moore, H. Eeles, to No. 41 Sqdn., Northolt ; W. F. C. Hobson, H. A. V. Hogan, to No. 54 Sqdn., Hornchurch ; W. S. Reed, J. C. Macdonald, to No. 56 Sqdn., North Weald ; M. W. S. Robinson, J. S. Sabine, to No. 111 Sqdn., Hornchurch ; R. T. Cazalet, to No. 207 Sqdn., Bircham Newton ; F. A. Pearce, J. P. Cecil-Wright, T. Q. Horner, R. F. Smith, to R.A.F. Base, Calshot ; H. T. Bennett, to School of Naval Co-operation, Lee-on-Solent.

Stores Branch

Flight-Lieutenants : F. J. W. Humphreys, to R.A.F. Base, Gosport ; 2.1.31 ; J. K. McDonald, to Station H.Q., Kenley ; 15.1.31.

Flying Officers : L. H. Anness, A.F.C., to H.Q., R.A.F., Cranwell ; 9.1.31. The following are all posted to Home Aircraft Depot, Henlow, on appointment to Permanent Commns., with effect from 5.1.31 :—E. E. Copper, G. A. Durnford, W. Eccles, F. B. C. Fundry, F. Lamdin, M.B.E., I. Lloyd, G. J. E. Parson, P. S. Stewart, C. H. Baker, M.B.E. (6.1.31). J. T. Brown (7.1.31).

Pilot Officers : The following are all posted to H.Q., R.A.F., Cranwell, on appointement to Permanent Commns., with effect from 9.1.31 :—J. R. Fraser, E. G. Moore, J. E. Shrimpton, H. A. Sudbury.

Medical Branch

Flight-Lieutenant G. J. Hanly, to Station H.Q., Upavon ; 16.1.31.

CONSTRUCTORS' SPECIAL NOTICE

De Havilland Notice to Owners and Operators of Gipsy I Engines

It has been found by experience that the effective life of the original type connecting-rod is 900 hours, and in their own interest owners of aircraft and engines are asked to change these rods after this time, as otherwise trouble may be experienced. If complete overhauls have been carried out more frequently than the schedule calls for, the rods should be changed when the engine has completed 900 hours' running.

The original type of connecting-rod has two holes on the underside of the small end, which converge into one hole where they enter the gudgeon-pin bore.

The new type of connecting-rod has two holes which are approximately 11 mm. apart where they enter the gudgeon-pin bore.

(*No.* 6, *January* 20, 1931.)

Royal Air Force. Air A.D.C. to the King

THE Air Ministry announces the appointment of Group Captain Edmund Digby Maxwell Robertson, D.F.C., as Air Aide-de-Camp to the King (vice Air Commodore Robert Peel Ross, D.S.O., A.F.C.).

Navigation Tables—Abbreviated for Insertion in the Nautical Almanac

To obviate the use of cumbersome nautical tables in the air, an abbreviated form has been produced which contains the essential tables for use in conjunction with the Nautical Almanac and the position line slide rule, in order to work out the results of astronomical sights. The tables are divided into two parts for convenience, both of which are necessary, and are known as R.A.F. Forms 787A and 787B. They should always be demanded together, and it is intended that they should be gummed in the Nautical Almanac.

Central Flying School Categories

THE undermentioned officers have been awarded categories, as stated below, from the dates shown against their names :—*Flight-Lieutenant* V. Crooke, "B," 19.11.30 ; Squadron Leader K. H. Riversdale-Elliott, "B." 6.12.30.

The undermentioned officers and airman pilot have been recategorised, as under, from the dates shown against their names :—*A2 to A1.* : Flight-Lieutenant G. W. Tuttle, 13.10.30 ; Flying Officer C. S. Ellison, 22.10.30 ; Squadron Leader H. P. Lloyd, M.C., D.F.C., 24.10.30 ; Flight-Lieutenant A. L. Paxton, D.F.C., 24.10.30 ; Flying-Officer G. A. Y. Tyson, 1.11.30. Pilot Officer L. R. S. Freestone, 4.11.30 ; No. 912 Flight-Sergeant Inglis, H. T., 24.10.30.

B to A2 : Squadron Leader A. C. Bayley, 3.5.30 ; Flying Officer J. B. Veal, 13.10.30 ; Flight-Lieutenant G. D. Harvey, 22.10.30 ; Wing Commander A. G. R. Garrod, M.C., D.F.C., 1.11.30.

Flying Training Courses for Attached Officers

THE undermentioned officers have been awarded the special assessment "Distinguished Pass" on completion of a course of "ab initio" flying training at the R.A.F. Training Base, Leuchars :—

Lieutenant, R.N., Flying Officer, R.A.F.
J. de F. Jago.

Lieutenant, R.M., Flying Officer, R.A.F.
N. R. M. Skene.

Flight Cadetships for Aircraft Apprentices. "The Lord Wakefield" Scholarships awards

THE Air Ministry announces :—Aircraft Apprentices J. C. Pope, P. R. Robinson, E. J. G. Jacobs, S. P. A. Patmore and M. K. D. Porter, from No. 1 School of Technical Training (Apprentices), Halton, have been selected for cadetships at the Royal Air Force College, Cranwell, on the result of the examinations held on completion of their three years' training as aircraft apprentices.

The "Lord Wakefield" Scholarships, valued at £75 each, have been awarded to Flight Cadet R. G. Stone (on the result of the recent competitive examination for entry into the Royal Air Force College), and to Flight Cadet J. C. Pope.

The Royal Air Force Memorial Fund

THE usual meeting of the Grants Sub-Committee of the Fund was held at Iddesleigh House on January 22. Mrs. L. M. K. Pratt-Barlow was in the chair, and the other members of the committee present were :—Air Commodore B. C. H. Drew, C.M.G. ; Sqdn.-Ldr. A. H. Wann. The committee considered in all 18 cases, and made grants to the amount of £388 12*s.* 1*d.*